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ABSTRACT

Focusing primarily on students with above-average ability, this study tries to measure the extent to which these students, or subgroups of them, are discouraged from applying to high-priced institutions by purely financial considerations. Questionnaires were developed and mailed to approximately 8,000 students selected randomly from the list of students who had taken the PSAT/NMSQT (Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test) and were entering college for the first time in the fall of 1976. Of the more than 2,800 questionnaires returned, 2,545 were used. A general model was used to explain why students in particular income/ability categories apply to institutions in given price/selectivity groupings. More specific models were developed to explain how individual students decide whether to apply to a particular group of institutions, using academic ability, family income, and other characteristics of the student as explanatory variables. Results show that students with above-average academic ability are less affected by the higher price of independent higher education than they are by their perceptions of the academic reputation of the institution. It was found that these conclusions generally apply to the different subgroups of students as well as the group as a whole. The appendices contain the regression results, a description of the analytical techniques, the survey questionnaire, and a list of the geographical regions covered by the survey. (SPG)

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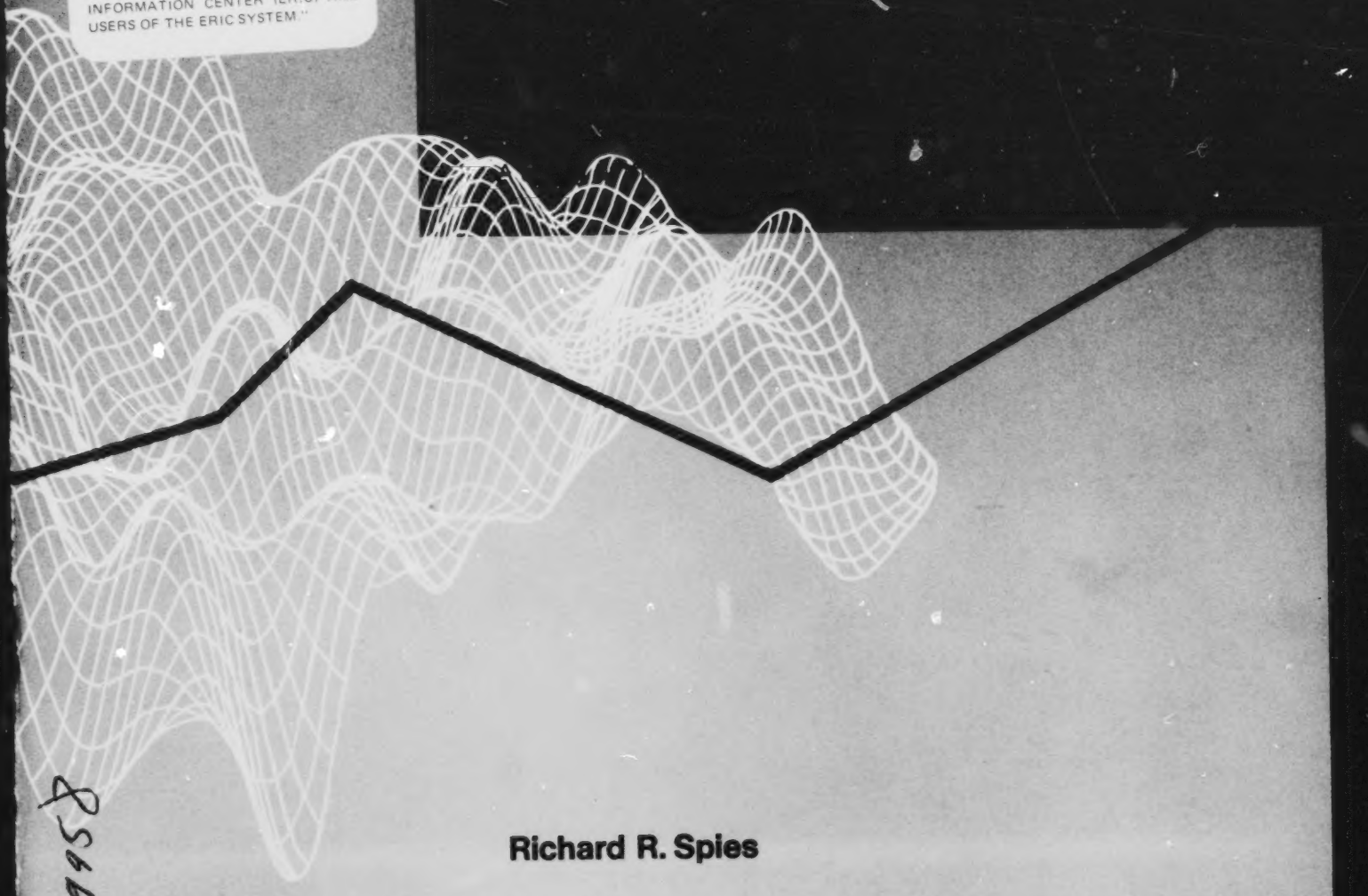

Richard R. Spies

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The Effect of Rising Costs on College Choice

A Study of the Application Decisions of High-Ability Students

by **Richard R. Spies,** Associate Provost, Princeton University

College Entrance Examination Board, New York, 1978

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The Consortium on Financing Higher Education (COFHE) is an association of 30 private colleges and universities. This study has been sponsored by the Consortium as part of a continuing effort to understand how students make decisions about applying to college.

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Foreword

The Consortium on Financing Higher Education has sponsored this study as part of a continuing effort to learn more about the process by which students make college choices. The member institutions of the Consortium are grateful to the Alfred P. Sloan Foundation for its financial support of this study and to the College Board for its technical assistance in gathering the data and for its support of this publication. The Consortium is also especially grateful to Dr. Richard R. Spies, Associate Provost at Princeton University, for his willingness to undertake this analysis.

Many members of the higher education community continue to be concerned about the ability--and willingness--of students and their families to assume the rising cost of a college education. In recent years federal and state government programs have done more to insure that qualified students are able to attend college. The Basic Educational Opportunity Grant Program, for example, is specifically designed to insure that all students, particularly those from low-income families, be provided with a level of support sufficient to insure access to higher education. However, when dealing with questions of equity and quality in higher education, the problem of assuring student choice continues to be an issue of undiminished concern to those who support and defend the place of high quality independent education in American life. The following report was undertaken to discover the degree to which college choice continues to include the full range of available institutions.

As the author acknowledges in the report, this study is not without its limitations: it concentrates on high-ability students and selective institutions; it addresses only the application decisions of those students, and not their enrollment decisions; and it relies heavily on multiple regression techniques with their statistical shortcomings. Despite these limitations, however, this study does provide certain insights into the decision-making processes of students and their families and, at a time when the competition for students is intensi-

fying, it is hoped that these insights will be of value to those who are concerned about the future of higher education.

Although the member institutions of the Consortium do not necessarily endorse the conclusions of the report, the work of Dr. Spies is presented here as a contribution to the improved understanding of how students make their college selections and as a stimulus to further research and discussion on this important topic.

The Consortium on Financing Higher Education

Acknowledgments

This study was conducted under the auspices of the Consortium on Financing Higher Education, and special thanks are due Richard J. Ramsden and Theodore L. Bracken of the Consortium staff for all their help. Without their advice and encouragement--and occasional prodding--this project would never have been completed.

The financial support for the project was provided through a grant from the Alfred P. Sloan Foundation. This grant made it possible to conduct the national survey required to generate data suitable for the kind of analysis used here. In addition, the College Board provided financial support for the publication of the results as well as essential technical assistance in assembling the data. I wish to thank both of these organizations for their generous assistance.

I also wish to thank all those people from the various Consortium institutions who contributed in so many ways to this effort. In particular, I want to acknowledge the contributions of the people who served on the committee that reviewed the project throughout its various stages and made many helpful suggestions: David Booth, Williams College; Arnold Collery, formerly of Amherst College; Donald Cooke, Cornell University; Ward Curran, Trinity College; David Hopkins, Stanford University; William Ihlanfeldt, Northwestern University; Gale Johnson, University of Chicago; D. Bruce Johnstone, University of Pennsylvania; and David Luecke, Washington University. I also want to thank Elizabeth W. Suchar and Georgia E. Stribling of the College Board and Barry Druesne and Elizabeth Cahill of Educational Testing Service for their assistance at several points in the project. Finally, I want to express my warmest thanks to Velga Stokes for her enormous help in keeping track of both the the mountains of computer files and the various drafts of the report. Responsibility for the contents of the report, including the choice of analytical techniques and interpretation of the results, rests entirely with the author.

R.R.S.

1 Introduction

The Nature of the Study

How do students, particularly students with above average academic ability, decide where to apply to college? How important are financial considerations in those decisions? Can the most selective and high-priced independent colleges and universities continue to attract sufficient numbers of high-ability students in the face of a decline in the number of people in the 18- to 21-year-old age group and a growing tuition gap between independent and public institutions?

Questions such as these are raised time and again in the literature of higher education, in the popular press, and in public-policy discussions, but there are few, if any, clear answers. This study attempts to answer at least some of these questions with empirical evidence. The study does, of course, view this set of questions from a particular point of reference: the member institutions of the Consortium on Financing Higher Education (COFHE) are high-priced, selective, independent institutions interested in attracting applications from the most able secondary school students. Thus the study focuses primarily on students with above-average academic ability and tries to measure the extent to which these students, or subgroups of them, are discouraged from applying to high-priced institutions by purely financial considerations. It is hoped, however, that the results, although they cannot be simply extrapolated to other groups of students or institutions, will be of wider relevance and usefulness within higher education.

The Design of the Study

It is important to note that there are at least three distinct stages in the college selection process: first, the student decides which college or colleges, if any, to apply to; second, each of those colleges determines whether or not that student should be admitted; and third, the student then chooses one of the colleges to which he or she has been admitted as the place to enroll. In order to understand how a student decides where to go to college, it is essential that one distinguish

among those three stages and examine each stage separately.

This study concentrates primarily on the first of these stages, the application decision. There are two compelling reasons for doing so. The first is that the application process is the area in which the least is known about how choices are actually made. After a student applies, an individual institution is able to follow the decision-making process closely. Most colleges monitor where students enroll when they turn down an offer of admission, and many institutions have undertaken studies to determine why students decide not to enroll. This type of research is best carried out at the institutional level where those doing the research are familiar both with the applicant group and with the subtle distinctions between the institution and its major competitors. The application decision, on the other hand, cannot be studied at the institutional level because each institution sees only those students who actually apply. In order to overcome this particular problem, this study is based on a national sample of potential applicants. Indeed, it is designed to try to answer, at least in part, the question that a single institution cannot answer based on its own data: which students apply to selective high-priced institutions, which do not, and why?

A second reason for concentrating on the application decision is that at this stage the student has the fullest range of options in determining the type of college to attend. The evidence seems to suggest that students, or at least those with above-average academic ability, apply principally to very similar colleges rather than picking one or two from each of several broad categories. This pattern suggests that the students have already begun to make certain basic decisions, such as the type of college they want to attend and how much they (or their parents) can afford to pay, before they send in their applications. It also suggests that the application decision should be examined first if one is to measure the effect of financial variables on college choice.

The application stage also has the advantage of being easier to analyze. Although there are certain costs (both financial and emo-

tional) attached to the application process, the student has a wide range of options, unencumbered by considerations of what admissions offices may decide about his or her qualifications for admission. (There is certainly some self-selection at work in this process, but one advantage of dealing with a sample of high-ability students is that most of these students should feel qualified to apply to almost any college in the country.) This is in contrast to the enrollment decision in which only one college can be chosen and the decision depends heavily on what the alternatives are. Any attempt to take full account of all these alternatives and the subtle differences among them in a formal analytical model is an enormously complicated task and beyond the scope of this study.

In order to obtain adequate data to analyze the application decision, a special survey was conducted with the assistance of the College Board and Educational Testing Service (ETS). Because it was important to collect data on students who had not applied to any of the COFHE institutions as well as those who had, it was necessary to use a national sample, without regard to where those students had applied. Toward this end, students were selected at random from the list of students who had taken the PSAT/NMSQT (Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test) and were entering college for the first time in the fall of 1976. In order to include only students of high academic ability, a minimum PSAT/NMSQT score was used as a cutoff; this score was intended to be approximately equivalent to a combined mathematics-verbal SAT score of 1100.[1]

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1. The Preliminary Scholastic Aptitude Test/National Merit Scholarship Qualifying Test (PSAT/NMSQT) is offered by the College Board and the National Merit Scholarship Corporation (NMSC). It is generally taken during the junior year in high school; its primary objective is to give the student some idea of his or her relative standing among students throughout the country, and thus to help that student make more informed judgments about college. The Scholastic Aptitude Test (SAT) is taken later in the junior year or early in the senior year and is normally part of the formal academic record considered by college admissions officers in evaluating applications. In this study the PSAT/NMSQT scores were used as the basis of the national sample because almost all high school students in the United States take these tests. A smaller number of students take the SAT, particularly in the Midwest and West where many colleges use the American College Testing Program's examinations (ACT). One of the objectives of this study is to measure regional differences

A questionnaire was developed and mailed to the parents of these students; a telephone follow-up of approximately 100 nonrespondents was also conducted using the same questionnaire to insure that the group that responded was reasonably typical of the entire sample.[2] Parents were asked to name the colleges to which their sons or daughters had applied, where they had been admitted, and where they were enrolling. In addition, they were asked a series of questions concerning their financial status and socioeconomic background. The responses to these questionnaires were combined with data already available in the College Board file for the student, including actual SAT scores, and data collected separately by Educational Testing Service about each of the colleges mentioned by the respondents.

The Characteristics of the Sample

Of the more than 2,800 questionnaires that were returned (out of approximately 8,000 questionnaires sent), 2,545 were sufficiently complete to be included in this analysis. Although this is a somewhat smaller number than originally anticipated, the distribution of responses was such that it was possible to do separate analyses of the important subgroups, particularly minority groups and students from the West and Midwest. Table 1.1 and Figures 1.1 and 1.2 summarize some of the relevant characteristics of the respondent group.

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in application patterns. Using the SAT score as the selection device could have introduced regional biases into the sample and so to avoid such biases, the nationally administered PSAT/NMSQT was used.

The PSAT/NMSQT score used as a cutoff in this study was a combined mathematics-verbal score of 106. This is equivalent to a combined SAT score of 1060. Since the average student improves his or her score by about 40 points between the PSAT/NMSQT and the first attempt at the SAT, most students in the sample could be expected to score 1100 or better on their SATs. Approximately 18 percent of all students taking the PSAT/NMSQT score 106 or better.

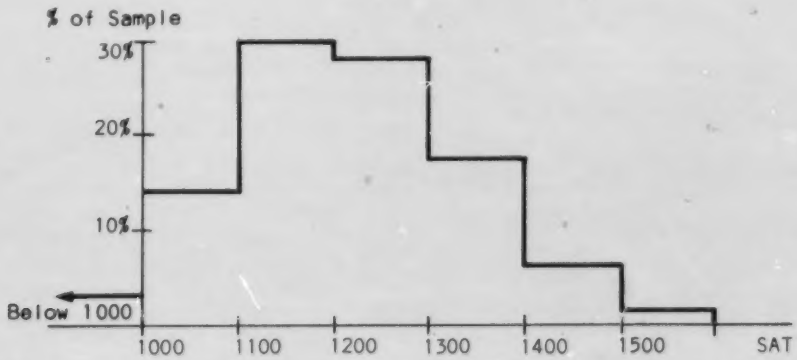
2. A facsimile copy of the questionnaire is included as Appendix C of this report. The questionnaire was sent to parents rather than to students in order to insure accurate information on family income and other financial variables.

Table 1.1 Summary Statistics for National Sample

		Number	Percentage
Sex	Male	1,524	59.9
	Female	1,021	40.1
	Total	2,545	100.0
Race	White	2,219	87.2
	Nonwhite*	326	12.8
	Total	2,545	100.0
Religion	Protestant	1,409	55.4
	Catholic	730	28.7
	Jewish	164	6.4
	Other	242	9.5
	Total	2,545	100.0
Region	New England	466	18.3
	Mid-Atlantic	522	20.5
	Midwest	540	21.2
	South	491	19.3
	West	526	20.7
	Total	2,545	100.0
High School Rank	Top 10%	1,636	64.3
	Second 10%	552	21.7
	Next 20%	270	10.6
	Below 60%	87	3.4
	Total	2,545	100.0
Type of High School	Public	2,140	84.1
	Independent/Parochial	405	15.9
	Total	2,545	100.0

*About 40 percent of the nonwhite respondents were black (4.9 percent of the total sample). Other minority groups included Chicanos and Latinos (3.2 percent), Orientals (2.0 percent), native Americans (0.5 percent), and all others (2.2 percent).

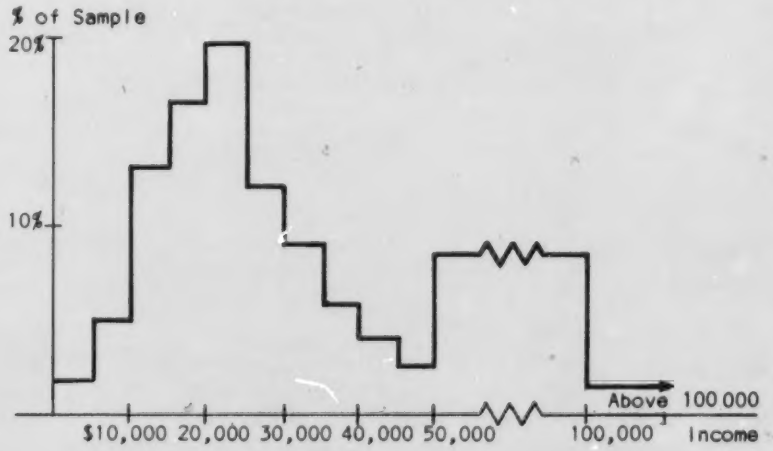
Figure 1.1 SAT Distribution of Sample



It is impossible to know with assurance how closely the sample corresponds to the population as a whole or whether there was a degree of self-selection that resulted in certain categories of people responding to the questionnaire and others ignoring it. However, the evidence that does exist suggests that the respondents were representative of the sample as a whole. For example, a comparison of the telephone responses with those received by mail did not indicate any significant differences in the key variables between the two groups. In addition, where the distributions of the original sample were known, the respondents seemed to conform to those distributions with almost uncanny precision. In particular, the original sampling procedure was designed so that one-fifth of the students would come from each of the five geographical regions[3] and one-eighth of the sample would be minority students. The distribution of the actual responses ranged from 18.3 percent of the total from New England to 21.2 percent from the Midwest, and 12.8 percent of the actual responses were from minorities. In addition, the income and ability distributions of the respondents were close to those of the sample as a whole.

There are many hypotheses about what factors influence a student's college choice. In this study, in which the particular interest is the

Figure 1.2
Income Distribution of Sample



3. See Appendix D for a list of the states in each region.

extent to which finances play a role in the application decision, it is impossible to take account of all these factors. It has been necessary, therefore, to concentrate on the financial variables of family income and institutional price, to see if they have any systematic effect upon college choice, and, if the answer is yes, to try to measure the magnitude of that effect. In the process it is possible to measure the importance of other factors such as the student's race and sex on the application decision, but that is not the primary objective. It should also be recognized that these effects can be measured only on an aggregate basis, that is, for the average student in the specific subgroup being examined. The decision-making process for any particular student is almost certainly more complicated than (or at least different from) the aggregate, and there is no way that a statistical model such as the one used here can predict or explain the decisions of individual students.

Historical Background

This study is similar to one conducted several years ago by Princeton University.[4] Indeed, it was the express intent of this effort to re-examine and update the results of that earlier work. As a result, the methodology developed in that study has been used in the process of designing this new project. In spite of the similarity, however, this project is not a simple repetition of the earlier study. On the contrary, this new work is an important undertaking in its own right, for three reasons.

First, this work serves to re-examine the basic conclusions reached in the earlier study and to refine them in certain ways. Any results based on a sample of a population are subject to some statistical uncertainty, and much can be learned about the reliability of those results from simply repeating the same analysis with a different sample.

Second, many people in higher education believe that the environ-

4. Richard R. Spies, The Future of Private Colleges: The Effect of Rising Costs on College Choice. Princeton, N.J.: Industrial Relations Section, Princeton University, 1973.

ment in which students make their college choices changed significantly between 1971 (when the earlier survey was conducted) and 1976. College costs rose dramatically over this period, and it is possible that the results of the 1971 survey cannot be extrapolated to these new cost levels. In addition, the attitudes of students and their families about the importance of college may have changed during these years. Unemployment and underemployment among college graduates, the increasing importance of community colleges and vocational schools, the end of the Vietnam war and the military draft--some argue that these various developments have, for many students, fundamentally changed the nature of the process by which they decide about college. One of the purposes of this study is to measure the extent to which the process may have changed over the intervening years.

Third, the current study attempts to expand upon and improve the earlier version. In particular, the fact that it is possible to do separate analyses by race, sex, and geographic region represents a significant improvement over the 1971 study.

General Conclusions

The results of this study largely substantiate the findings of a few years ago: for high-ability students, the ability of the prospective applicant and the academic reputation of the institution are much more important in the choice of a college than the financial considerations of price and family income. The similarities between the actual results of the two studies are noteworthy, and they reinforce the earlier conclusion that students with above-average academic ability are less affected by the high price of independent higher education than they are by their perceptions of the academic reputation of the institution.[5] One of the important new findings of this study is that these conclusions generally apply to the different subgroups of students as well as

5. Throughout this study the academic reputation or selectivity of an institution is measured by the median combined SAT score of the enrolled students. Since it is the student's perception of institutional selectivity or quality that matters in choosing a college, this median SAT score is, for the purposes of this study, a better measure of academic reputation than any formal measure of actual quality.

to the group as a whole. In general, they should be encouraging to the high-priced, selective institutions. In a broad sense, they suggest that institutions placing the highest priority on preserving and strengthening their academic programs during a time of financial constraint should have more success attracting qualified students than they would if they concentrated on cutting costs in an attempt to minimize tuition increases. The evidence suggests that if an institution is perceived to be providing education of high quality, able students from a wide range of economic and social backgrounds will apply.[6]

6. It is important to remember that most of the highly selective institutions have extensive financial aid programs. Part of the reason these colleges can attract students from low-income groups is that the net cost for these students is much lower than the stated tuition and fees. In terms of the net cost to the student's family, such institutions may not be any more expensive than lower-priced alternatives.

2 A General Model of Applications

The Model

When students begin to decide where to apply to college, they have many factors to consider. These factors include quite importantly the academic reputation and price of various institutions; they also include the student's own academic ability and family income. Presumably the student sorts out the relative importance of these and other factors and selects a group of colleges to which he or she will apply. This chapter attempts to measure the impact of an institution's selectivity and price and student ability and family income on the application decision. In particular, a comparison is made of the effects of the financial variables of price and income with the effects of the educational variables of institutional selectivity and student ability to see whether financial or educational considerations play the greater role in the application decisions of the most able students.

The method of analysis is a multiple regression[1] in which price, income, selectivity, and student ability are used to explain the probability that different categories of students will apply to the various categories of institutions. It is assumed in this regression that the percentage of students in a particular income/ability category who apply to at least one college in a given price/selectivity category is a function of the income and ability levels of those students and the price and selectivity levels of the colleges. The purpose of performing the regression analysis is to estimate the specific relationship between the percentage of students applying to a particular set of colleges and each of those four variables. The results of these regressions are reported in Table A.1 of Appendix A, and the rest of this chapter is devoted chiefly to a discussion of those results.

Before entering into that discussion, however, it should be emphasized that the model discussed here refers only to categories of institutions of a given price and selectivity. The design of this study

1. See Appendix B for a brief explanation of regression techniques and of some of the specific statistical problems encountered in this study.

does not permit one to predict with any accuracy wnether an individual student will apply to a specific college, and the experience of any one institution may differ from that of the group as a whole. A student's specific decision about where to apply may depend on much more than the general characteristics of price, selectivity, income, and ability. Many other factors influence that decision, including an institution's geographic location; distance from home; the social environment of the campus; recommendations from parents, teachers, and friends; contacts with local alumni; and so on. The purpose of this analysis, however, is to determine the extent to which the application decision of the average student in the sample can be explained by each of the four variables being studied.

It should also be understood that the particular models and data used in this part of the study involve certain statistical limitations. The results should, therefore, be viewed with a certain degree of caution. In particular, the fact that institutional price and selectivity are often related causes estimation problems, as does the correlation between family income and a student's SAT scores.[2] Nevertheless, this kind of general regression model is the best way to look separately at the effects of each of these variables while holding all the others constant, and the results should give at least a general sense of how much weight students attach to these different factors in making their decisions.

Educational Considerations

Figures 2.1 and 2.2, both of which are derived from the regression results reported in Table A.1, show the effects on application rates

2. The correlation between two variables makes it difficult to distinguish the different influences and to determine, for example, how much of the change in application rates is caused by a change in institutional selectivity and how much is caused by the change in price that normally accompanies it. For the purpose of analysis, one would ideally like to have price and selectivity be independent of one another so that one could look at different groups of institutions that are in the same selectivity category but have different prices--and vice versa. In this case the variables were not independent, making it difficult to measure accurately the separate effects of price and selectivity.

of changes in student ability and institutional selectivity, assuming that family income and institutional price remain constant.[3] In particular, Figure 2.1 indicates that the likelihood that a student will apply to a particular group of colleges increases as the student's academic ability, as measured by SAT scores, increases.[4] It also shows that students at all ability levels (within this general high-ability group) are more likely to apply to the more selective group of institutions--i.e., colleges that have median SAT scores of 1400 as opposed to those with median SAT scores of 1200--and the change in the likelihood of applying caused by a given increase in the student's SAT scores is larger for the institutions with higher median SAT scores. In other words, students in the sample generally are more likely to apply to at least one of the more selective colleges, all other things being equal, and the likelihood of applying to such colleges increases with a student's academic ability.

These results, while reasonable, are not completely similar to those obtained from the 1971 survey described earlier. As shown in Figure 2.1, both studies indicate that the effect of SAT scores on applications is more pronounced for the most selective colleges than for those with median SAT scores of 1200. However, the 1971 survey actually showed a decline in applications to the less selective institutions as the students' SAT scores increased, presumably because these high-ability students believed they should concentrate their attention on the more selective colleges. There is some indication in the 1976 study that this kind of self-selection still occurs, but the evidence is less clear than it was in the earlier study.

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3. In all these figures a specific value is chosen for all the variables and then the variables being examined are changed while all the others are held constant. In this chapter the variables take the following values when there is no explicit indication otherwise: student SAT score of 1200; family income of $30,000; median SAT score of 1200 for the institution; student expenses of $6,500 at the institution. The 1971 study used generally similar values for these variables although some attempt has been made to adjust the income and expense numbers for inflation.

4. To be precise, the figure shows the likelihood that a student will apply to <u>at least one</u> college in the price/selectivity category. The student may be applying to just one institution in this group or several, and he or she may also be applying to institutions in other groups.

Figure 2.2 shows the relationship between the selectivity of a college as measured by the median SAT scores of its students and the student's application decision, assuming everything else is held constant. Clearly, an institution's academic reputation plays a major role in the application decision: for students who have SAT scores of 1400, for example, the probability of applying to a college with a median SAT score of 1400 is 46 percent, whereas only 29 percent of such students are

Figure 2.1
Effects of a Student's SAT Scores on College Applications 1976

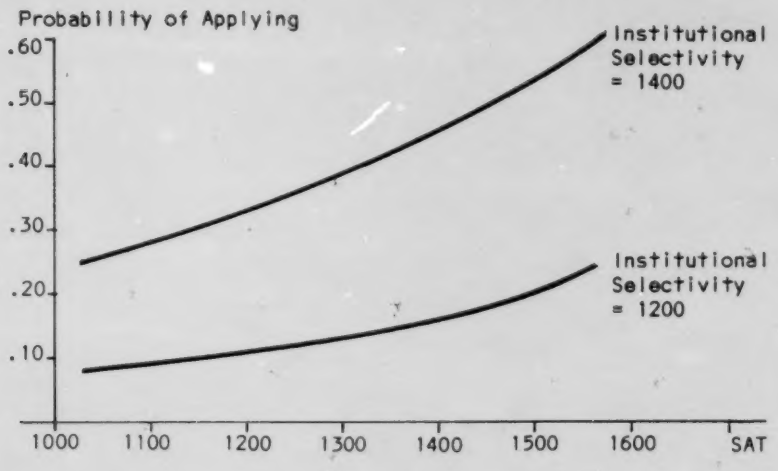
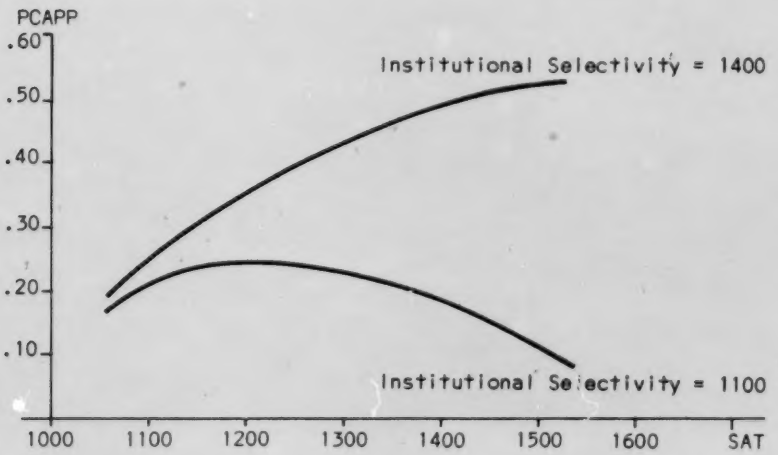


Figure 2.1
1971



likely to apply to a similar college with a median SAT score of 1300. Figure 2.2 also shows that the students who are affected most by differences in perceived academic quality are those who themselves have the greatest academic potential. Again the 1971 study showed an actual decline in applications from students in the lower SAT ranges as a college's median SAT score rose above a certain level; the 1976 data indicate only a slower rate of increase in the probability of applying.

Figure 2.2
Effects of a College's Selectivity (Median SAT) on College Applications
1976

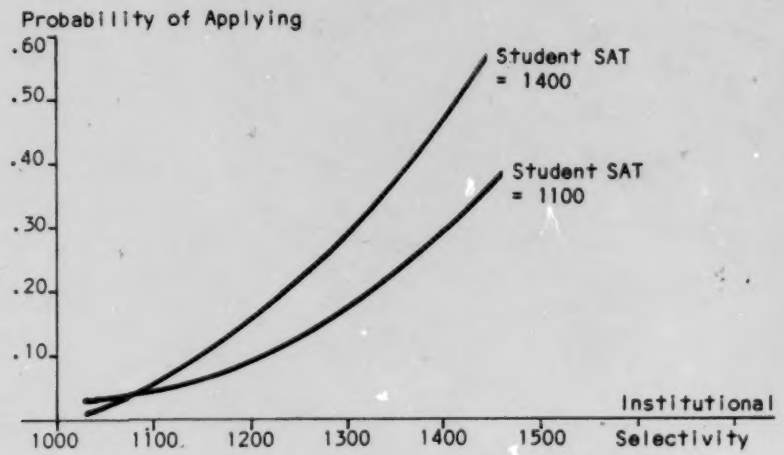
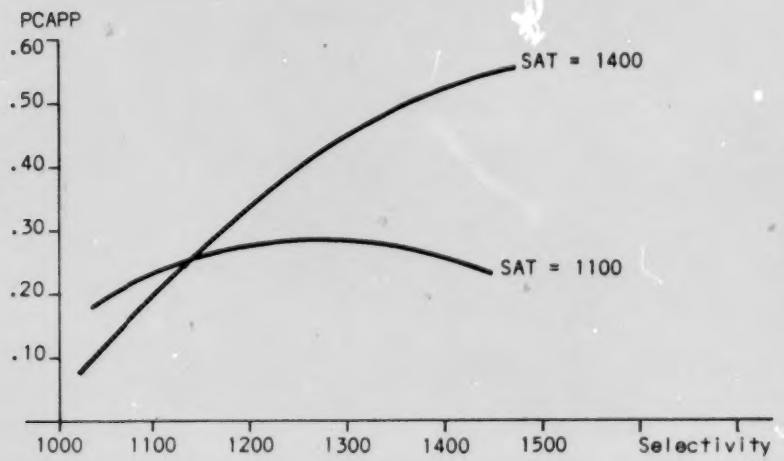


Figure 2.2
1971



In general, the results described in Figures 2.1 and 2.2 seem reasonable, and they are similar to those derived in the earlier study. Despite the limitations of a general regression model of this kind and the difficulty of finding the exact mathematical expression that best describes the relationship between these variables and the probability of applying, one conclusion is quite clear: both institutional selectivity and student ability continue to play major roles in students' decisions about college applications.

Financial Considerations

Figures 2.3 and 2.4 show the effects on application rates of changes in family income and college price respectively, assuming that student ability and institutional selectivity are held constant. Figure 2.3

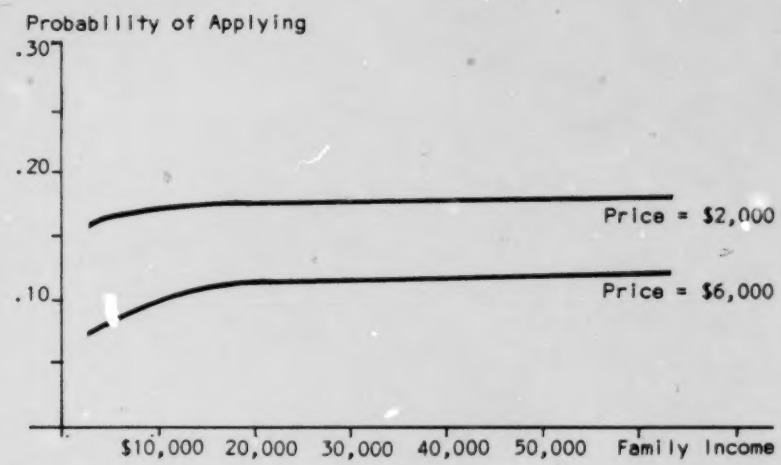


Figure 2.3
Effects of Family Income on College Applications 1976

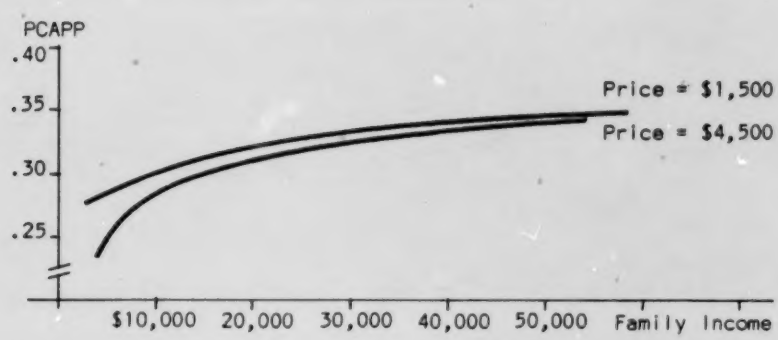


Figure 2.3
1971

indicates that students at all levels of family income are less likely to apply to a college costing $6,000 than one costing $2,000, all other things being equal, but that the probability of applying to either category of institutions is affected only slightly by the family income variable. This is essentially the same conclusion drawn in the earlier study, although in 1971 family income had a somewhat greater effect and the differences in the probability of applying to institutions in different price categories tended to disappear for students in the higher-income ranges.

Figure 2.4 shows the relationship between college price and the probability of applying, again holding everything else constant. It appears from Figure 2.4 that price does have some influence on application patterns, but the effect is relatively small, especially considering

Figure 2.4
Effects of College Price on Applications 1976

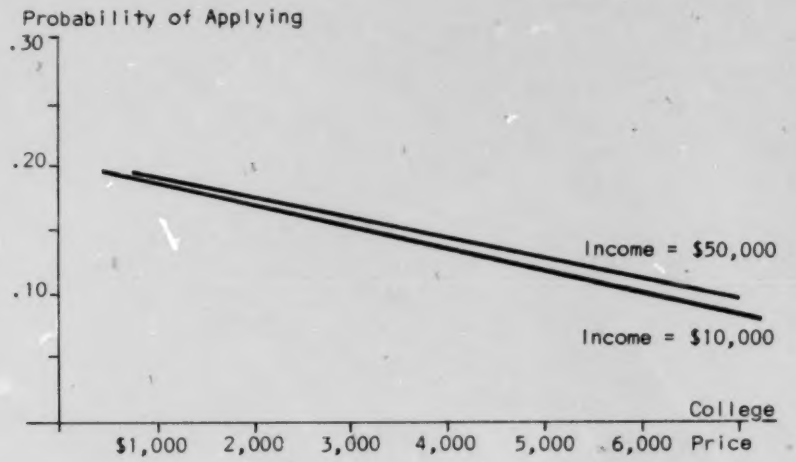
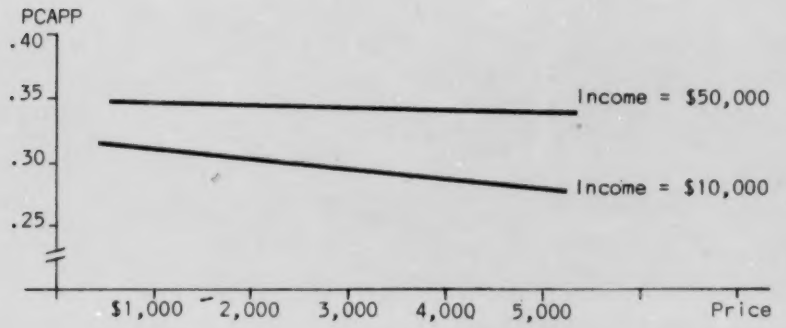


Figure 2.4
1971



that everything else, including the selectivity of the college, is assumed to remain unchanged. Again, this observation is consistent with the results in the earlier study.

Conclusions

A student's academic ability and the selectivity of the institution seem to play much more important roles in the application decisions of high-ability students than institutional price and family income. The percentage of such students who apply to colleges that have a price of $6,000 is only about 5 percentage points less than the percentage applying to institutions with a price of $3,000; on the selectivity side, a 5 percentage point difference in application rates occurs when the difference in median SAT scores is only about 50 points. This suggests that an institution faced with the choice of increasing tuition or damaging its academic reputation by cutting back programs might do more to discourage applications if it followed the latter course.

Although the general conclusions are consistent with those reached in the 1971 study, there are certain qualifications that must be made. In the first place, the mathematical models used to describe these relationships do differ in some of their details, and this raises questions concerning the comparability of some of the specific results. In addition, a model of this kind necessarily deals with groups of colleges rather than individual institutions. Implicitly it is assumed that all of the institutions in each group will change their prices together. If one of these institutions were to move to a price quite different from those charged by its closest competitors, the effect on its applicant pool would probably be much more dramatic. Another reason for caution is that the results of this study are based on an analysis of cross-sectional data;[5] it is sometimes misleading to use data collected at one point in time to predict what will happen as changes occur over time.

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5. Cross-sectional data are collected by observing the behavior of many different units (e.g., students) all at the same point in time. Time series data, on the other hand, are collected by observing the behavior of the same unit at several different points in time.

Finally, it is important to remember that the model incorporates only four key variables affecting college choice. Many other variables, some potentially very important, are not included, and it is hard to know whether the omission of these variables affects the estimates for any of the variables that are included.[6]

Despite all of these qualifications, the results of this general model do seem reasonable. In order to verify these general conclusions--and to look more closely at the applicant pool for the most selective and high-priced independent institutions--the next four chapters look at how individual students decide whether or not to apply to institutions in certain price/selectivity categories.

6. Omitting important variables normally affects the estimates of the coefficients of the variables that are included only if those excluded variables are correlated in some systematic way with the included variables. There is no reason to believe that this is a serious problem in this case.

3 High-Priced Independent Institutions

The Group of Colleges

There are 27 colleges and universities in the United States with total student expenses of at least $6,000 a year in 1976-77 and combined median SAT scores of 1300 or more.[1] If selectivity in admission can be used as a proxy for the academic reputation of an institution--or more accurately as a proxy for students' perception of academic quality--it is reasonable to look more closely at how students decide whether or not to apply to institutions in this group, where the trade-off the student faces between price and selectivity is the most pronounced. This group of institutions was included in the general applications model described in Chapter 2, but the only individual characteristics that could be included in that model were academic ability and family income. In this section of the report, these specific institutions are analyzed more closely in order to determine the effects on student choices of other variables such as race, sex, and the educational background of the parents, and to obtain better estimates of the specific income and ability effects than could be derived from the general model of Chapter 2.

The actual regression results are reported in Table A.2 of Appendix A. The remainder of this chapter summarizes and interprets those results, and sets them in the context of the basic questions being addressed in this study.

The Effects of Academic Ability

It is clear from the regression results that a student's academic

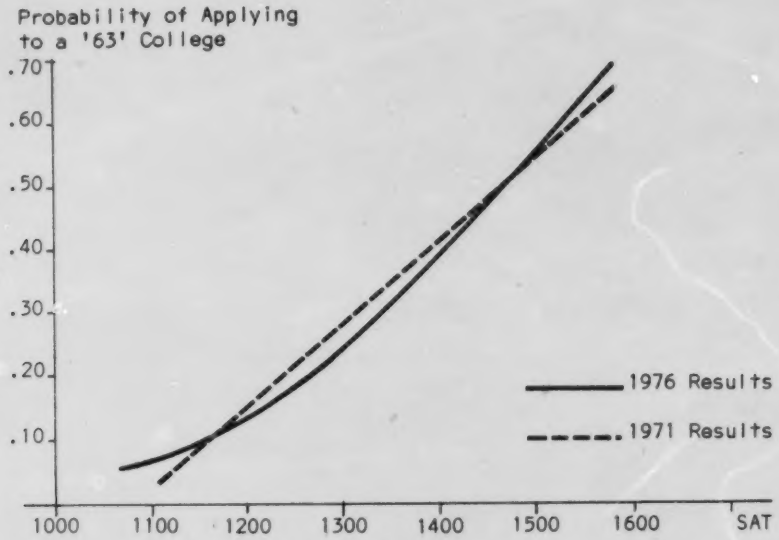
1. The expense figures are the typical student budgets for 1976-77 reported by the institution to the College Scholarship Service (CSS) and include tuition and fees, room, board, and personal expenses. The median combined SAT scores are for freshmen enrolling in the fall of 1970 (the most recent year for which complete data are available).

Twenty-two of the thirty COFHE institutions are included in this group. Seven of the other eight COFHE institutions had total student expense budgets of $6,000 or more but reported median SAT scores in the 1200-1299 range; one institution had a median SAT score over 1300 but reported student expenses of slightly less than $6,000.

ability, as measured by SAT scores, plays a major role in his or her college choice: the higher a student's SAT scores, the more likely he or she is to apply to one or more of the colleges in this group of selective and high-priced institutions.[2] Indeed, the results indicate that academic ability is the single most important factor in this decision.

Figure 3.1 shows the effects of a change in a student's SAT score on the likelihood that he or she will apply to at least one institution in the "63" category, assuming that all other factors that affect this decision (family income, race, etc.) remain unchanged.[3]

Figure 3.1



2. In this study these institutions are referred to as the "63" group. The "63" category is defined as all those institutions for which the estimated student budget exceeds $6,000 and the median SAT score is 1300 or above. Similar labels are used for other groups of institutions.

3. Except where explicitly indicated otherwise, the figure describes a white Protestant male who is an only child, resides in the Middle Atlantic or Western states, graduated from a public high school in the top 10 percent of his class, and has at least one parent who is a college graduate. In the figures that show the relationship between the likelihood of applying and SAT scores, it is assumed that the student's family had a total income of $20,000 in 1975; in the figures in which income is the variable being examined, it is assumed that the student had a combined SAT score of 1200.

For purposes of comparison, Figure 3.1 also shows (as a broken line) the comparable results from the earlier study.[4]

Figure 3.1 shows quite clearly that SAT scores have a major impact on the probability of applying to a "63" college. If a student's combined SAT score increases from 1300 to 1400, for example, the probability of applying to a "63" college increases by about 15 percentage points (from .24 to .39), an increase of over 60 percent; indeed, a student with a combined score of 1450 is about twice as likely to apply as a student with a 1300 score. These results are consistent with the results of the general model described in Chapter 2, but they do indicate that SAT scores have a substantially greater impact on application rates than was evident earlier. Figure 2.1, for example, indicates that the application rate at the most selective institutions (i.e., those with median SAT scores of 1400) is approximately 7 percentage points greater among students with 1400 SAT scores than for comparable students with 1300 SAT scores; this compares with the 15-point difference shown in Figure 3.1. The basic conclusions are the same in both cases--academic ability does in fact play an extremely important role in the application process--but the estimates of the magnitude of that role differ by a factor of 2. As was pointed out in Chapter 2, there are statistical problems associated with the estimation of the general model and, therefore, one is inclined to have somewhat more confidence in the specific estimates summarized in Figure 3.1.

As Figure 3.1 shows, these results are quite similar to those obtained in 1971. The earlier results indicated a linear relationship between SAT scores and the likelihood of applying, and the 1976 results show a nonlinear relationship with the likelihood of applying rising at an increasing rate-- but the differences are not great. The results of both studies strongly support the hypothesis that a student's decision about whether or not to apply to one of these selective and high-priced

4. In that study the category of institutions was defined as all those with student expenses of $4,000 or more and a median combined SAT score of at least 1300. Since costs have risen significantly over the last five years, the student expense cutoff was increased to $6,000 in order to keep the two groups of institutions comparable.

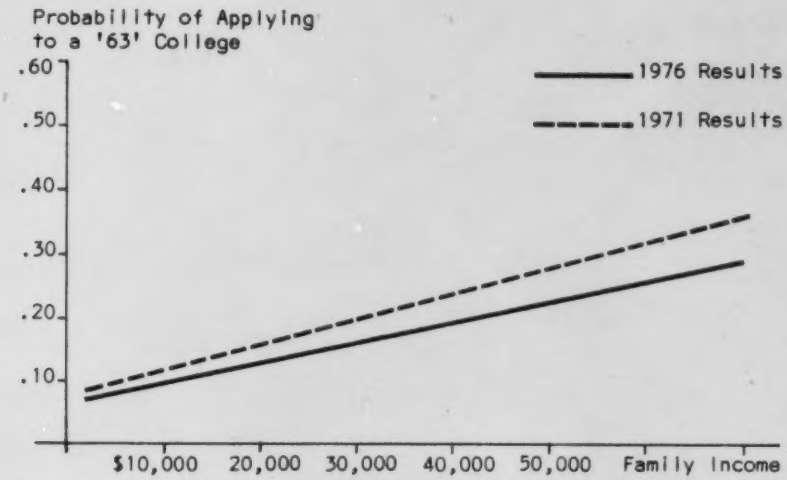
institutions depends heavily on academic ability.[5]

The Effects of Family Income

The regression results indicate that family income has a statistically significant effect on the application decision. Figure 3.2 provides a convenient description of those results and compares them with the results of the earlier survey.

It is clear from looking at Figures 3.1 and 3.2 that the effect of family income, while statistically significant, is much smaller than the effect of academic ability. An increase of $10,000 in family income results in an increase of only 3.2 percentage points in the likelihood of applying to at least one "63" college, and an increase in income of $50,000 only results in an increase of 16 percentage points. In other

Figure 3.2



5. In all of these figures it is not very meaningful to compare the absolute levels of the application rates for the two different studies. Different variables were used in the two studies, making it impossible to compare two perfectly identical groups of students. If, for example, only New England students were included in the 1976 survey, the line showing the 1976 results would be 21 percentage points higher than it is shown in Figure 3.1. In addition, for some variables such as family income, the measurements have changed even if the variables have not. In Figure 3.2, for example, the two studies are compared using current dollar incomes without making any adjustments for inflation. If the 1976 income levels shown there were adjusted to make them comparable (in real dollars) to the 1971 levels, the 1976 line would shift upward dramatically.

words, for a typical student with a 1300 SAT score and family income of $20,000 a year, a 100-point increase in the combined SAT score would have almost the same effect as increasing family income by $50,000--an increase of 15 percentage points in the probability of applying versus an increase of 16 points. Given the considerable concern that has been expressed in a variety of forums about the willingness of low- and middle-income families to assume their share of the costs associated with these institutions, it is perhaps surprising that income has such a small impact on the applications decision, even among students in these income ranges.

Once again, these results are very similar to those obtained in the earlier study. Indeed, the two lines in Figure 3.2 are almost parallel, which means that the estimates of the effect of a given change in income are almost identical for the two studies.[6]

The results are also similar to the results of the general model described in Chapter 2 (as depicted in Figure 2.3). The more specific model developed in this chapter shows a considerably greater impact of income on the application decision, but the general conclusion that income plays a relatively small part in this decision is supported by the results of both analyses. Again, the estimation problems discussed in Chapter 2 probably make the estimates of this more specific model more accurate measures of the magnitude of the impact.

One of the most common myths in the financial aid and tuition discussion is what has become known as the "middle-income squeeze." According to this theory--or, more accurately, this hypothesis--colleges in the "63" category are gradually becoming accessible only to the very poor and the very rich. This hypothesis assumes that upper-income families have always been able to afford these schools, while lower-income students receive large financial aid packages that enable them to attend.

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6. It might be argued that these results are not strictly comparable to those of the earlier study because of the effect of inflation. A change in income of $10,000, for example, represents a smaller change in real (i.e., inflation-adjusted) income in 1976 than it did in 1971. This means, in effect, that the coefficients for 1976 understate somewhat the effects of a change in real income.

It is the students in the middle, so the argument goes, with little likelihood of receiving financial aid, who are discouraged from applying. This hypothesis has sufficient believers to merit further attention.

The results summarized in Figure 3.2 do not test this hypothesis directly. Because family income enters the regression analysis only as a single linear variable, the estimate of the relationship between income and the application decision must also take a linear form. It is, therefore, impossible to tell from Figure 3.2 whether or not the so-called middle-income squeeze really does exist, and so separate regressions were run with family income entered, not as a single variable, but as a series of dummy variables for different income ranges.[7] In theory these regressions should make it possible to compare directly the different income categories in order to determine which groups are more or less likely to apply to "63" institutions.[8]

The step function in Figure 3.3 describes the results of those regressions and compares them with the results of the linear form of the regression (the straight line). There is no evidence in these analyses of any so-called middle-income squeeze. Middle-income students, usually defined for these purposes as including people with family incomes as high as $35,000, are no less likely to apply to one of these

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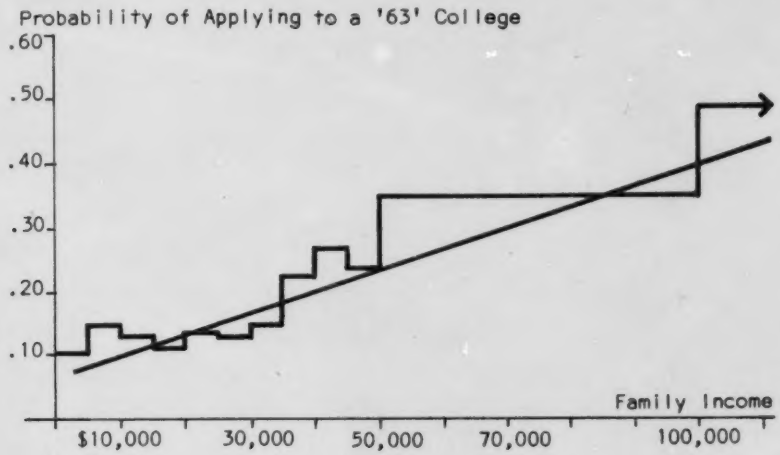
7. A dummy variable is a common device used in regression analysis to compare two separate categories of people. Suppose, for example, that it is suspected that men spend more money on consumer goods than women, even when their incomes are exactly the same. To test that hypothesis, a multiple regression could be run in which the amount of spending depends on income and a dummy variable that takes the value one if the person is male and zero if the person is female. The regression would then provide estimates of the coefficients of income and this dummy variable. Assume that those estimates were 0.80 and 3,000 respectively. This means that the predicted spending level for any individual would be S = 0.80 x Income + 3,000 x Dummy. For a man earning $20,000, then, expected spending would be 0.80 x 20,000 + 3,000 x 1 = $19,000; for a woman with the same income expected spending would be 0.80 x 20,000 + 3,000 x 0 = $16,000. In other words, the estimated coefficient for the dummy variable indicates that men spend $3,000 more than women with the same income. In the same way a negative coefficient for the dummy variable would indicate that men spend less than women within the same income bracket.

8. The use of dummy variables makes it possible to observe directly the differences in application rates for the separate income categories, holding all other variables constant; using a single income variable, on the other hand, forces the different income groups to conform to some prespecified functional form such as a linear relationship.

institutions than their low-income counterparts, although both groups are less likely to apply than are students with incomes above $35,000. The results do indicate some reason for concern about middle-income students, however, in that these students do not appear to be any more likely to apply than low-income students, all other things being equal.[9]

One possible explanation for this result is that financial aid programs at these institutions are doing exactly what they are intended to do: assisting students and their parents in meeting the expense of college by requiring of them only what they can reasonably be expected to pay. It may be that families realize that the effect of these financial aid policies is to equalize the financial burden on different categories of students within the aid group, thus making them all equally likely to apply, all other things being equal. Given the tentativeness of this hypothesis it would be unwise to place an enormous amount of confidence in a conclusion of this kind. Nevertheless it is a plausible--and encouraging--explanation of the empirical results. In any event, it is difficult to conclude from the evidence presented here

Figure 3.3



9. This result cannot be seen, of course, when a single linear term is used for income. In the 1971 study the comparable regressions using dummy variables for the different income ranges were analyzed but were not discussed in the final report. Those regressions showed a similar but much less marked pattern, and it was concluded that there was no evidence to support the middle-income-squeeze hypothesis.

that disproportionate numbers of middle-income students have been discouraged from applying to "63" institutions because they fear the financial burdens would be too great or that these institutions are becoming bipolar in the income distribution in their student bodies.

Other Considerations

Several other variables were included in the regression analysis, mainly as a control for differences in students' socioeconomic backgrounds so that the separate effects of academic ability and family income could be isolated; the estimated coefficients for all these variables are included in Table A.2. It is encouraging to note that the estimates show all the variables working in the expected direction, and most of these estimates seem reasonable in magnitude as well. Several of these variables will be discussed in more detail in Chapter 4 where the results of regressions run separately for subgroups of students are reported.

The results indicate that minority students (defined as all nonwhites) are 20 percentage points more likely to apply to a "63" institution, all other things being equal. This difference is substantial and implies that a high proportion of academically qualified minority students are applying to these colleges, at least in part, presumably, because of the extensive recruitment efforts that many of these colleges have undertaken. Indeed, it appears that minority students apply in even greater proportions than white students with similar income and ability characteristics. Equal opportunity will not be achieved until the distribution of students among different income and ability categories for minorities becomes more like that of whites, but it is encouraging to note that the recruiting efforts of the last ten years appear to have had some effect on the application patterns of minorities. The earlier study showed a similar result (although with a smaller coefficient), but there were too few minority students in that sample for the results to be very meaningful.

The religious backgrounds of students also appear to have some impact on their college choices. Jewish students are about 14 percentage

points more likely to apply to "63" institutions, all other things being equal. Given the importance that many Jewish families have traditionally attached to education, this result is not surprising. Catholic students, on the other hand, seem to be slightly less likely to apply to a "63" college, by about 6 percentage points. This relatively small effect may be due in part to the existence of a number of Catholic colleges and universities in the "52" group, i.e., those with median SAT scores in the 1200's and student expenses between $5,000 and $6,000.

The sex of the student appears to have no effect on the application decision. A dummy variable was included for sex in all of the regressions, and the estimated coefficient was close to zero in every case. Although women are apparently underrepresented in this high SAT group (only 40 percent of the sample[10]), the women actually in the group follow the same application patterns as the men in the group.

The educational level of the parents has a relatively small effect on a student's college choice, with the probability of applying to a "63" institution rising slightly as the parents' educational levels rise. For example, a student with at least one parent who has a college degree is about .7 percentage points more likely to apply than a student whose parents have gone only through the sixth grade, holding income and other family characteristics constant. Since parents with extensive higher education are more likely to place a high value on education for their children, this result is not surprising.

Students who attended private or parochial secondary schools are about 12 percentage points more likely to apply to "63" colleges and universities than their public school counterparts. This probably reflects the somewhat greater emphasis on college preparatory work and extensive college counseling in independent secondary schools and, for many, a long tradition of sending students on to selective colleges and

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10. The chief reason for the underrepresentation of women in this sample is that fewer women achieve high scores on the mathematics section of the SAT. Although women generally achieve similar scores on the verbal SAT as do men, using a minimum combined score as a cutoff for the sample means that fewer women are included.

universities. It also undoubtedly reflects the greater importance attached to a college education by many of the families who send their children to private secondary schools.

The student's high school rank also affects the application decision to some degree. A student in the 90th percentile of his or her high school class is about 2 percentage points more likely to apply than a student in the 80th percentile, all other things being equal.

Dummy variables are also included in the regression to try to measure any regional differences that might exist in the application decisions of these students. It appears that students who live in New England are much more likely to apply to one of the "63" institutions than their counterparts in other areas of the country (over 20 percentage points), and students in the South and Midwest are somewhat less likely to apply (by 10.5 and 11.5 percentage points respectively). These differences are somewhat greater than expected, but generally they appear to be reasonable: New England has a large number of "63" institutions with long histories of serving students in that region; the South and Midwest, on the other hand, have many fewer "63" colleges and have well-established, well-regarded systems of state universities. Students from the Middle Atlantic states and the Far West seem to fall somewhere between these two groups.

Students from large families are slightly less likely to apply to "63" colleges than those from smaller families. In particular, each additional dependent child in the family lowers the student's likelihood of applying by about 1.3 percentage points. The effect is small, but the number of dependent children is one measure of a family's financial obligations and it is reasonable to expect this factor to have some negative impact on application rates for the higher-priced colleges.

Finally, it appears that students who apply for financial aid are 6.3 percentage points more likely to apply to a "63" institution than a student with the same characteristics who does not apply for aid. The process by which aid affects the student's application decision is an enormously complicated one, and there is no way that it can be fully incorporated into a simple regression model, but the aid application

variable used here does provide at least some measure of the student's knowledge of the financial aid process. It is not unreasonable to expect that, all other things being equal, a student is more likely to apply to a high-priced institution if he or she knows enough about the process to believe--correctly or incorrectly--that there is a strong chance of receiving financial aid.

Conclusions

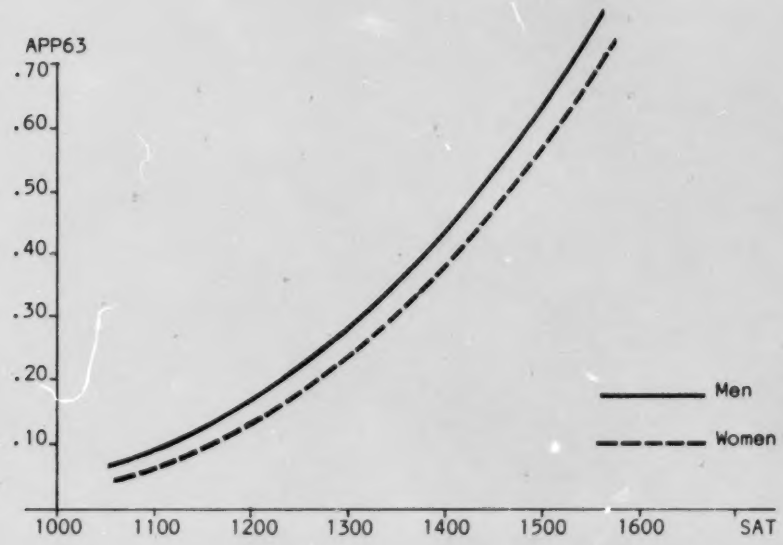
The findings reported in Chapter 3 support those reported in Chapter 2 and in the 1971 study: academic ability is by far the most important factor in a student's decision about whether or not to apply to a selective but high-priced college; financial variables, including family income, do affect that decision, but to a lesser degree.

4 High-Priced Independent Institutions: An Analysis of Subgroups of Students

Subgroups

In the analysis described in the previous chapter, a number of variables are included in the regressions to measure the effects of student characteristics other than family income and academic ability on the application decision. As the discussion in Chapter 3 points out, some of these characteristics have a sizable impact on a student's decision to apply to an institution in the "63" category. But that analysis provides only an incomplete explanation because it implicitly assumes that two students who are alike in all respects except one (for example, race) are influenced by all the other variables (such as family income) in exactly the same way. It may be, however, that the greatest difference between whites and nonwhites is that for one group the likelihood of applying increases dramatically as income rises while income has little or no effect on the other group. The regressions described in Chapter 3, which take account of race by means of a dummy variable, cannot detect such differences.

Figure 4.1
Effects of SAT on APP63 Grouped by Sex



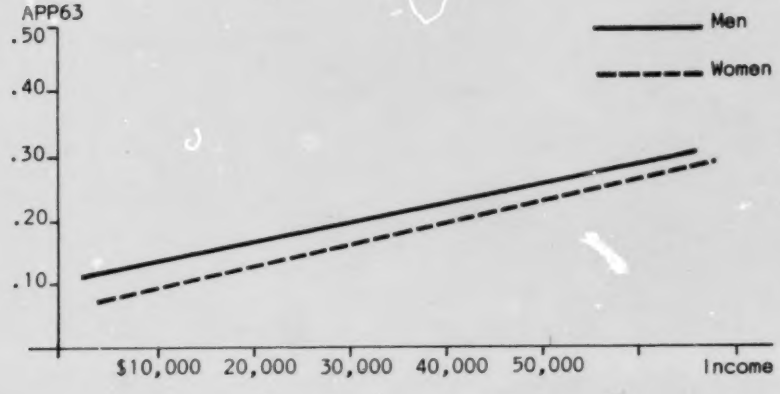
In order to see whether or not these kinds of differences exist, separate regressions were run for different subgroups of students. The students were grouped by sex, by race (white and nonwhite), by religion, by geographic region, and by whether or not they had applied for financial aid. The results of those regressions are reported in Table A.3; the rest of this chapter consists of a brief discussion of those results.

By Sex

The results of these regressions confirm that men and women in this group are influenced by the same factors in choosing a college. Figure 4.1 shows that they are both heavily influenced by academic ability (as measured by SAT scores) in deciding whether or not to apply to a college in the "63" category; indeed, the relationship between SAT scores and the likelihood of applying to one or more of these institutions is almost identical for men and women.

The results also indicate that the effects of income on college choice are very similar for men and women. Figure 4.2 shows that income plays a relatively small role in the application decision for both men and women. It appears, then, that the conclusions reached in Chapters 2 and 3 on the relative effects of family income and academic ability on the decision to apply to a high-priced and highly selective college apply equally for both sexes.

Figure 4.2
Effects of Income on APP63 Grouped by Sex

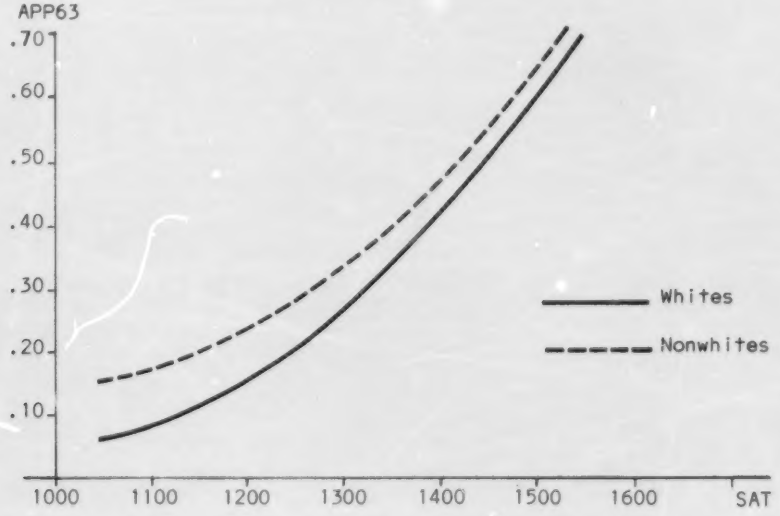


By Race

The regressions for whites and nonwhites provide some interesting, but not altogether surprising, results. Figure 4.3, which shows the relationship between academic ability and the likelihood of applying to a "63" institution, confirms one of the findings in Chapter 3: all other things being equal, a minority student is more likely to apply than his or her white counterpart.

What Figure 4.3 points out that could not be detected earlier is that the difference between minorities and nonminorities in the likelihood of applying is greatest in the lower ranges of academic ability; for students with very high SAT scores the difference virtually disappears. One plausible explanation for this result is that minority students with SAT scores in the 1100-1200 range have been the target of more active recruiting efforts than nonminority students with equivalent scores. In order to broaden the pool of minority applicants, many of the "63" colleges have encouraged applications from students whose traditional academic credentials (such as SAT scores) might otherwise be considered marginal. There are many reasons for this kind of recruiting policy: test scores are often poor indicators of academic ability for students from different cultural backgrounds; students from educationally deprived backgrounds, many of whom are minorities, must be evaluated

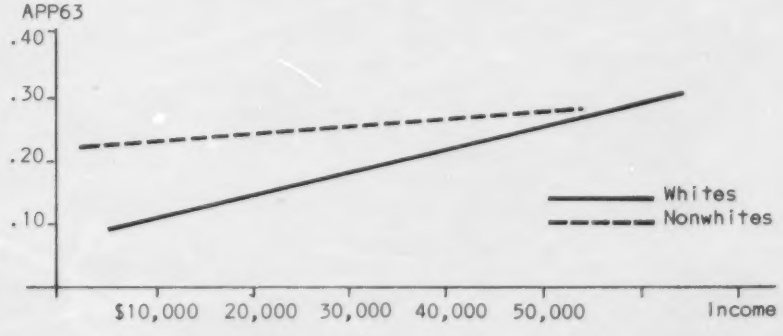
Figure 4.3
Effects of SAT on APP63 Grouped by Race



with more consideration taken of academic potential than achievement; the need for diversity in the student body requires more extensive recruiting among minorities; and so on. But the important point is that such recruiting policies do exist, and the results shown in Figure 4.3 seem to indicate that they have been effective in encouraging applications from minorities. A large proportion of students in the very top of the academic range will apply to the "63" institutions, whatever their ethnic or racial backgrounds; for students just below that range, these recruiting efforts seem to have resulted in somewhat higher application rates for minorities than for whites in the same category. Apparently minority students in this latter category are more aware of the opportunities offered by these institutions and are more apt to feel that they have a good chance of being admitted.

Figure 4.4 shows that a similar pattern occurs for family income: in the high-income categories whites and nonwhites apply in about the same proportion to "63" institutions, but low- and middle-income nonwhites are more likely to apply than their white counterparts. Apparently minority students, perhaps because of intensified recruitment practices, understand better than whites that the financial aid policies of these colleges will generally enable them to attend if admitted.[1] White students, on the other hand, are more influenced by family income, although even for them the effect of income on the application decision is considerably less than the effect of SAT scores.

Figure 4.4
Effects of Income on APP63 Grouped by Race



1. Note that the estimated coefficient of income in the nonwhite regression, as reported in Table A.3, is not statistically significant.

By Religion

Figures 4.5 and 4.6 describe the effects of academic ability and family income respectively on the application decisions of Protestant, Catholic, and Jewish students. In general, these results confirm earlier observations that Jewish students are significantly more likely to apply to a "63" college than Protestants, all other things being equal, and Catholics are slightly less likely to apply than Protestants. It appears that the relationship between SAT scores and the likelihood of applying (Figure 4.5) is more dramatic for Jewish students than for

Figure 4.5
Effects of SAT on APP63 Grouped by Religion

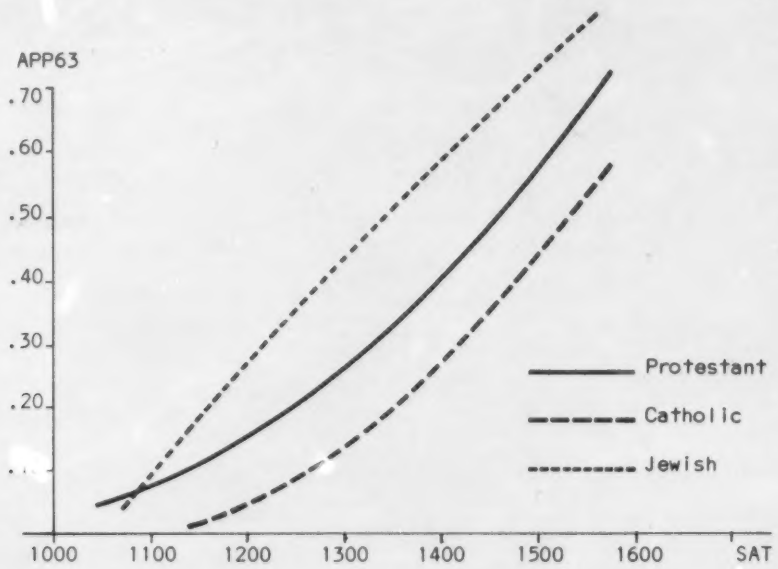
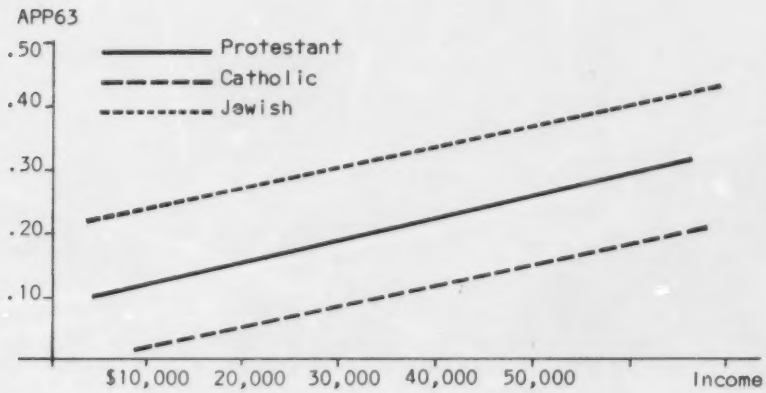


Figure 4.6
Effects of Income on APP63 Grouped by Religion



other students, especially in the lower SAT ranges, but even here the differences are not great. On the other hand, the effects of a change in income are almost identical for all three groups: the lines shown in Figure 4.6 are nearly parallel. For all three groups, as in the general models described earlier, academic ability has a much greater impact on the application decision than family income.

By Region of the Country

In this part of the analysis students from each of the five different regions of the country are analyzed: New England, the Middle Atlantic states, the Midwest, the South, and the Far West. In general, the results of these separate regressions are very similar to the results described in Chapter 3 for the combined regression: in every case, the impact of academic ability on the application decision is substantial (Figure 4.7), whereas the impact of family income, although statistically significant, is much smaller (Figure 4.8).

Students from New England are far more likely to apply to one of the "63" colleges (many of which are located in New England), all other things being equal, but the pattern for the other regions is less clear. There is some indication that the application rates of Southern and Midwestern students are below those of students from the other regions; the application rates of Mid-Atlantic and Western students, on the other hand, are slightly above those of their Southern and Midwestern counterparts but well below those of New Englanders. This is especially evident in Figure 4.8, although the differences are smaller and less obvious than would be expected from the results of Chapter 3.

It is difficult to generalize about these results, but it is interesting to note some of the regional differences depicted in Figures 4.7 and 4.8: Southern students, although generally less likely to apply to a "63" college than students from other regions, seem slightly more affected by their SAT scores and less by family income; Western students are also more affected by their SAT scores and less by family income; students from the Mid-Atlantic states are more heavily influenced by family income than the other groups but the effect of SAT scores on

their application rates is near the average; students from the Midwest are also near the average in terms of the effects of SAT scores but they are less heavily influenced by family income; finally, students from New England are more likely to apply to "63" institutions at all levels of income and SAT score, but the differences between application rates at one SAT or income level and another are about the same as they are for students from the rest of the country.

Figure 4.7
Effects of SAT on APP63 Grouped by Region

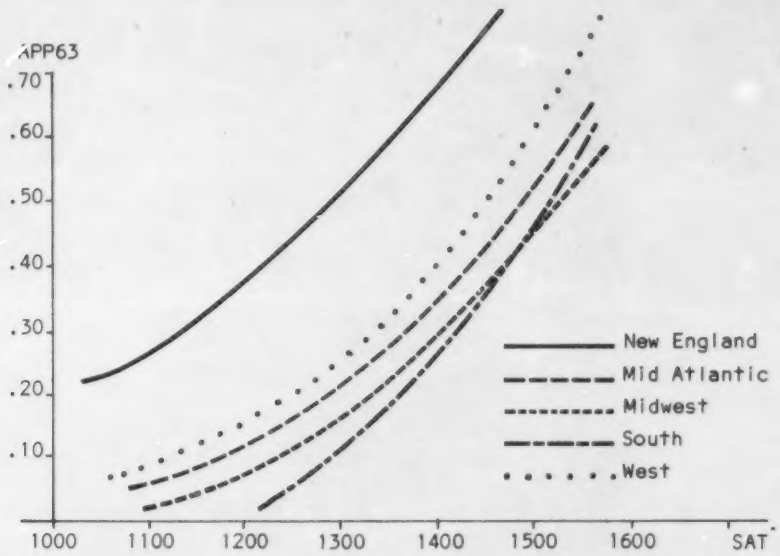
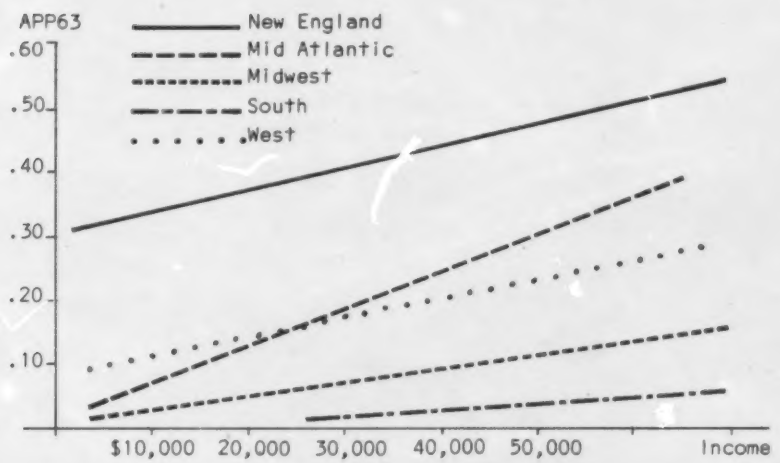


Figure 4.8
Effects of Income on APP63 Grouped by Region



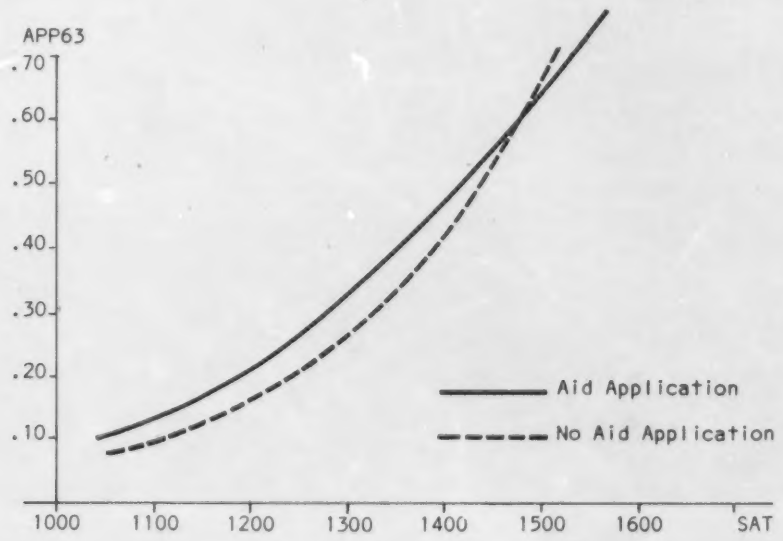
Some of these regional differences are probably the result of normal statistical fluctuations in the data and no special significance should be attached to them. The important finding, in any case, is that students in all five regions follow the same general pattern: academic ability clearly outweighs financial considerations in the application decision in all cases.

By Aid Application

Figure 4.9 indicates that the application decisions of students who apply for financial aid are influenced by academic ability in approximately the same way as they are for non-aid students. For both groups academic ability plays a major role in determining whether or not the student will apply to a "63" institution.

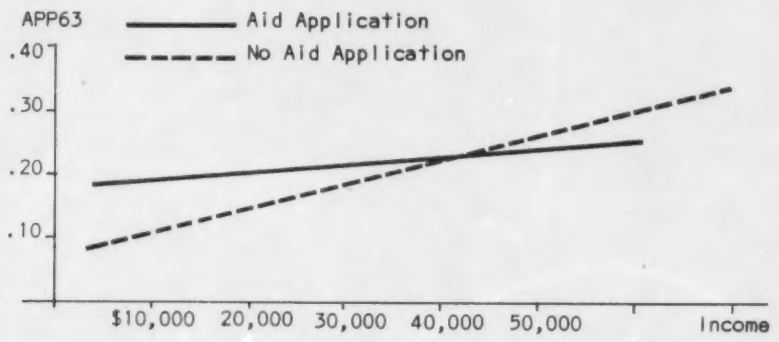
Figure 4.10 indicates how application rates differ for the two groups at different levels of family income. As one might expect, students in the low- and middle-income ranges who are well enough informed to apply for financial aid (and presumably have some hope of actually receiving some kind of financial assistance) are more likely to apply to a "63" college than those students in the same income categories who think, correctly or incorrectly, they will have to

Figure 4.9
Effects of SAT on APP63 Grouped by Aid Application



pay their own way. As income rises in these ranges, the likelihood of applying to these colleges increases very little for aid applicants. This pattern is exactly what would be expected if students understood how financial aid programs work at these institutions: an increase in family income normally results in a smaller aid package, based on the family's increased ability to pay. Indeed, the express purpose of the kind of financial aid policy followed by most of these colleges is to neutralize the effects of income differences for low- and middle-income students by expecting of them only what they can reasonably afford to pay, thus reducing the importance of income as a consideration in their application decisions. For students who do not understand these aid policies, however, an increase in family income will have some impact because it affects directly their ability to pay what they perceive to be the high cost of an institution in this category. At some point on the income scale (apparently around $40,000 in Figure 4.10) the expectation of receiving significant amounts of aid is so small that aid ceases to be a factor in the application decision and income begins to play much the same role as it does for students who do not apply for aid.

Figure 4.10
Effects of Income on APP63 Grouped by Aid Application



5 The Application Decision: An Analysis of Four Groups of Colleges

The Groups of Colleges

In addition to the "63" category, it seems appropriate to look briefly at some other groups of institutions. Such an analysis can provide some useful information about the institutions in these categories and about how students decide whether or not to apply; it also provides a means of comparing the "63" colleges with some of their most logical competitors to see how their applicant pools differ.

This chapter examines the application patterns for four categories of colleges and universities: the most selective colleges with student expenses of more than $6,000 a year and combined median SAT scores of 1300 or better (the now familiar "63" group); the equally high-priced but slightly less selective "62" colleges (those with student expenses of more than $6,000 a year and median SAT scores in the 1200-1299 range); the 30 institutions in the Consortium on Financing Higher Eudcation;[1] and a group of 18 highly regarded state universities. For all four groups regressions similar to those described in Chapters 3 and 4 were run in an attempt to explain how students decide whether or not to apply to institutions in these categories. The results of those regressions are reported in Table A.4 of Appendix A and are summarized below.

The Impact of Academic Ability

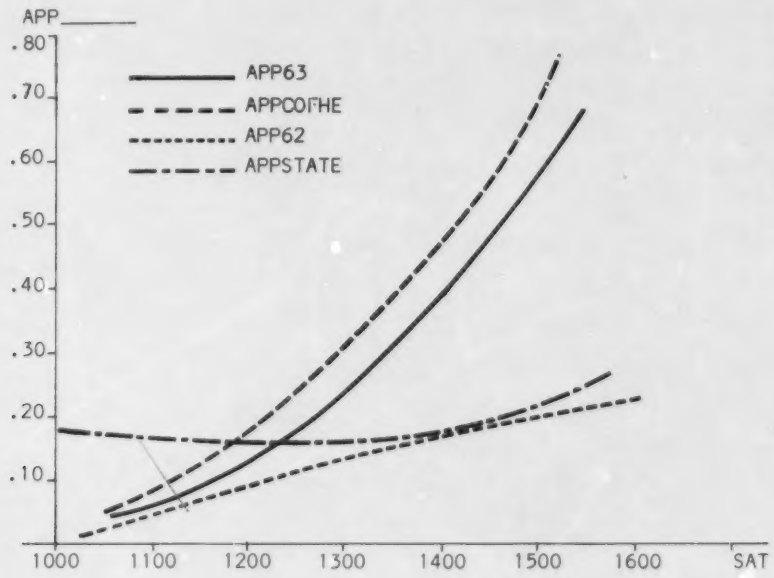
Figure 5.1 shows the relationship between SAT scores and the likelihood of applying for each of the four groups of institutions. The curves for the "63" category and the COFHE colleges are nearly identical, with the Consortium curve about 5 percentage points higher at all SAT levels. (This similarity is not surprising because the two groups include so many of the same institutions.) In both cases, the impact of academic ability on the likelihood of applying is great, especially for students at the highest SAT levels. The importance of this relationship is discussed in Chapter 3 and will not be repeated here.

1. As indicated earlier there is substantial overlap between this group and the "63" category: 22 of the 27 institutions in the "63" category are COFHE members.

In contrast to the "63" institutions, the probability of applying to colleges in the "62" category increases only slightly as SAT scores rise. The likelihood of applying to such colleges increases only about 10 percentage points (from .10 to .20) as the student's SAT scores go from 1200 to 1500, whereas the same increase in SAT scores would result in an increase in application rates for "63" or Consortium institutions of more than 40 percentage points. The relationship is more linear for the "62" colleges, and, indeed, the curve flattens out at the higher SAT levels, all of which is basically consistent with the results described in Chapter 2. Apparently students at the top of the SAT range are more likely to decide that they want to apply only to the most selective colleges and universities, presumably those in the "63" category, and thus choose to apply less often to "62" colleges.

The results for the state university group are more difficult to interpret. The general model in Chapter 2 would suggest that SAT scores should have a positive but small effect on the decision to apply to one of these less expensive and less selective public institutions; what the state university curve in Figure 5.1 indicates is a relatively constant level of applications across all SAT levels. One possible explanation

Figure 5.1
Effects of SAT on Applications to Different Institutions

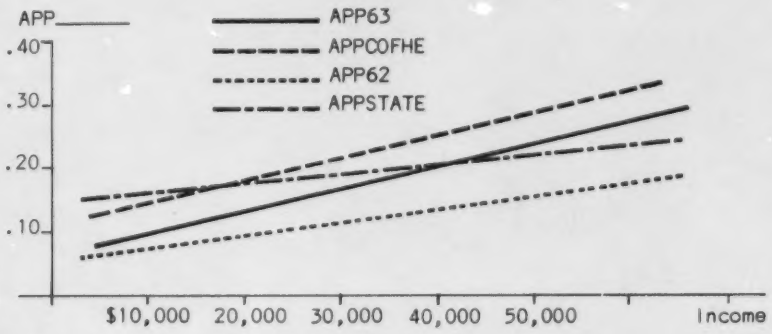


for this phenomenon is that many students, even at the higher-ability levels, apply to these institutions in addition to applying to the "63" institutions, probably because they believe the likelihood of their being admitted is higher at one of these well-regarded but less selective state universities than it is at the "63" colleges. Two things are clear, however: the relationship between academic ability and the likelihood of applying is much less dramatic for these state universities than it is for the private "63" institutions, and students in the highest ability ranges are far more likely to apply to these private colleges and universities than they are to apply to even the most highly regarded public institutions.

The Impact of Family Income

Figure 5.2 describes the relationship between family income and the likelihood of applying for each of the four categories of institutions. Again, the overlap between the "63" colleges and the Consortium institutions is clearly evident in that the rate of increase in applications is virtually the same for both groups. As was seen earlier, however, this rate of increase is quite small: an increase of about $30,000 in family income is necessary to produce a change of 10 percentage points in the application rate. The effect of income on applications to "62" institutions is, somewhat surprisingly, even smaller, although still statistically significant. Finally, for the state universities income has the least impact: an increase of $30,000 in family income results in an increase of only 3 percentage points in the application rate.

Figure 5.2 Effects of Income on Applications to Different Institutions



The general conclusions to be drawn from Figure 5.2 are the same as those arrived at in Chapter 2: income does play a role in the application decisions for all students and all institutions; that role is somewhat greater for the higher-priced colleges; but for all colleges and universities the magnitude of the effect is relatively small and, for the most selective institutions at least, academic ability plays the more important role.

6 Another Aspect of the Application Decision: Public or Independent?

An Interesting Question

In most of the analyses described in previous chapters, institutions have been categorized solely on the basis of their total student expense budgets and their selectivity as measured by median SAT scores. Although it has been implicitly assumed that the higher-priced colleges are all independent institutions and that many of their lower-priced competitors are public, the analysis has not explicitly focused on the public/independent differences to see if certain groups of students apply disproportionately to one or the other. An interesting set of questions to ask is: Which students are likely to apply only to public institutions? Which students are likely to apply only to independent institutions? And which apply to both? In this chapter these questions are examined briefly, first by looking at simple summary statistics on the kinds of students who follow each of these strategies and then by applying regression techniques of the kind discussed in previous chapters.

It should be pointed out before the discussion of these results is begun that this is not a fine-tuned attempt to analyze what is obviously a very complicated process. There are no typical public institutions or typical independent institutions, and a student's decision about whether to apply to one or the other--or both--obviously depends on which public institutions and which independent institutions he or she is considering. The categories of institutions that have been considered up to now (e.g., the "63" colleges) have been relatively homogeneous at least in terms of price and quality. Categorizing institutions solely on the basis of their governance will not produce the same kind of homogeneity, so any results that are derived here should be interpreted with extreme caution.

Who Is Applying Where?

Table 6.1 indicates the percentages of students in the sample who applied only to public institutions (37.0 percent), only to independent institutions (28.2 percent), and to at least one institution of each type (34.8 percent).[1] The table also shows the same percentages for certain subgroups of students.

Looking at the subgroups, it appears that there are no substantial differences between men and women in this regard, although men are

Table 6.1 Applications to Public and Independent Institutions

		% Applying Only to Public	% Applying Only to Independent	% Applying to Both Public and Independent
Total Sample		37.0%	28.2%	34.8%
By Sex	Men	36.0	27.5	36.5
	Women	37.7	29.7	32.5
By Race	Whites	37.8	27.7	34.5
	Nonwhites	30.7	32.1	37.2
By Region	New England	13.9	40.0	46.1
	Mid-Atlantic	20.4	38.6	41.1
	Midwest	48.0	26.8	25.2
	South	46.6	23.1	30.3
	West	53.3	14.4	32.4
By Income	0-$10,000	37.4	28.9	33.7
	$10,000-20,000	39.6	26.2	34.2
	$20,000-30,000	41.1	24.2	34.7
	$30,000-40,000	39.0	29.3	31.7
	$40,000-50,000	24.7	35.7	39.6
	$50,000+	22.1	39.3	38.6
By SAT Score	Below 1100	41.3	23.3	35.4
	1100-1200	45.8	22.9	31.3
	1200-1300	34.1	30.6	35.3
	1300-1400	21.1	40.7	38.3
	1400+	15.5	40.5	44.0

1. This group of students is not typical of the college-going population as a whole (only about 25 percent of whom attend independent institutions) since this study was designed to concentrate on high-ability students.

slightly less likely to apply to only one category of institution and slightly more likely to apply to at least one of each. Minority students are more likely than whites to apply to independent colleges or to both public and independent institutions, and less likely to apply only to public colleges or universities. This finding is consistent with the hypothesis that recruiting programs, which have in general been somewhat more extensive at independent colleges and universities, have had a significant effect on minority applications.

As one might expect, there are large regional differences in the percentages of students who follow the different strategies. About 40 percent of the students in this sample from New England and the Middle Atlantic states apply only to independent institutions, as opposed to 20 percent or less who apply only to public institutions; in the Midwest, the South, and particularly the Far West, higher percentages apply only to public institutions.

When the students are divided into income categories, a very clear pattern emerges: of students with family incomes up to about $40,000, about 40 percent apply only to public colleges and universities, 25-30 percent apply only to independent institutions, and the other 30-35 percent apply to both; for students from families with incomes above $40,000 the percentage applying only to public institutions falls dramatically, and the percentages applying to both and only to independent institutions increase. It appears, then, that the results of this simple one-dimensional analysis are consistent with the earlier findings (in Chapter 3) concerning the so-called "middle-income squeeze." Although the application patterns of people with family incomes in the $20,000-35,000 range look more like those of the people on the low end of the income scale than those on the high end, these middle-income people are not being discouraged from applying to high-priced independent colleges and universities.

The distribution of applications by SAT score should be encouraging for independent institutions. It is clear that students in the upper ranges of academic ability, particularly those with SAT scores of 1300 or better, are more likely to apply to independent colleges, and

much less likely to apply only to public colleges and universities. Of the very best students in this sample, only about 20 percent or less decided not to apply to independent colleges and universities at all.

Some Simple Regressions

In order to measure the effects of income and ability on the public/independent decision, while holding everything else constant, simple regressions were run along the lines of those described in previous chapters; the results are reported in Table A.5 of Appendix A. As was pointed out earlier, this simple model is less useful than it would be with a more homogeneous group of institutions, but it does produce some interesting results.

Figure 6.1 shows the effect of academic ability on the application pattern assuming that other variables are held constant. Students in the lower ability ranges are more likely to apply only to public institutions, but as ability increases, the likelihood of applying to both public and independent colleges, or even solely to independent institutions, increases markedly. Above a certain level of academic ability--apparently at about the 1300 SAT level--students are more likely to apply only to independent institutions than they are to apply only to public institutions. This implies quite strongly that independent

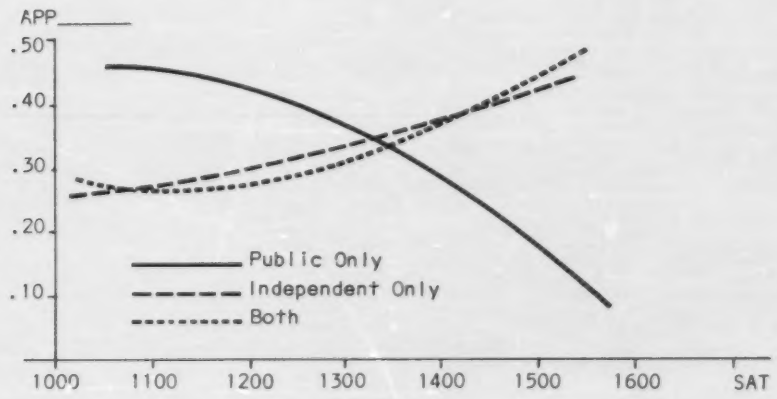


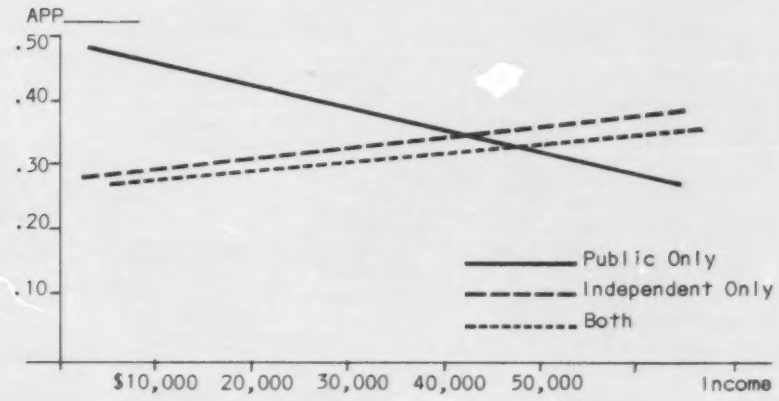
Figure 6.1 Effects of SAT on Applications to Public and Independent Institutions

institutions as a group are reasonably competitive in terms of their ability to attract applicants from the pool of high-ability students and that, in fact, they are most successful attracting students at the very top of the SAT range.

Figure 6.2 shows the effects of family income on the likelihood of appiying to public or independent institutions. It is clear from this diagram that students from high-income families are more likely to apply to independent colleges than low-income students, but the difference is quite small. For public institutions, the reverse is true, and low-income students are apparently more likely to apply, but again the extent of the difference is small. Although income has a statistically significant effect on the application decision of these students, it appears that SAT scores are the more important factor.

In general, these results, although less specific and much less definitive than any of the earlier results, do support the basic conclusion emphasized over and over again in this study: financial considerations, such as price and family income, do have some effect on the application decision, but educational considerations, particularly the selectivity of the college and the academic ability of the student, are by far the most important determinants of college choice.

Figure 6.2 Effects of Income on Applications to Public and Independent Institutions



7 Conclusion

This study has attempted to measure the effects of educational and financial variables on the college application decisions of high-ability students. In general, it was found that both factors affected application decisions, but that the educational considerations were considerably more important. In Chapter 3, for example, it was pointed out that increasing a student's combined SAT score by only 100 points has about the same effect on the likelihood of applying to colleges in the "63" category as a $50,000 increase in family income.

These results were obtained from two somewhat different methods of analysis: in Chapter 2 a general model was used to explain why students in particular income/ability categories apply to institutions in given price/selectivity groupings; in Chapters 3 through 6 more specific models were developed to explain how individual students decide whether or not to apply to a particular group of institutions, using academic ability, family income, and other characteristics of the student as explanatory variables. The first model addressed the general question of how students are influenced by both their own characteristics and the characteristics of the colleges as they decide where to apply. The second model looked more closely at how the characteristics of individual students affect their decisions about applying to particular groups of institutions. The first model, then, provided an overall view of the application decision whereas the others provided a more detailed look at the particular applicant pools available to specific groups of institutions.

The conclusions of the two analyses were generally consistent. In both cases the financial variables do have some impact on the college application decision but educational considerations are generally more important. The exact magnitudes of the effects differ, but, given the statistical limitations associated with the general model, that is not surprising. The general model of Chapter 2 is useful in that it provides an overall perspective of the process of college choice, but the precise estimates derived from the more specific models of Chapters 3

through 6 are probably more reliable.

Although the basic findings of this study are clear, their meaning and usefulness as a guide to future action depend at least in part on the perspective from which one views the whole set of questions related to the process of college choice. From the perspective of the public policymaker or the student advocate, these results may not be as encouraging as they are from an institutional perspective. Even though there are enough able students from a wide range of socioeconomic backgrounds to fill the available spaces at the most selective colleges and universities, it is clear that low- and middle-income students are less likely to apply to such institutions than their counterparts from high-income families. This means, in effect, that these colleges are in some sense less accessible for low- and middle-income students. This condition may be a result of real differences in the ability of families in different income categories to finance attendance at such colleges (or in their perception of their ability to pay),[1] or it may simply be a result of differences in attitudes about college in general and selective colleges in particular. Nevertheless, differences in accessibility do apparently exist even among students of comparable academic ability. This is not a new phenomenon, of course, and it is certainly not realistic to expect that equal proportions of students from all income groups will attend such colleges. Still, despite the extensive financial aid programs that have been implemented at many of these institutions in recent years, a case can be made that more could conceivably be done to improve the access of low- and middle-income students to the full range of colleges and universities.

From the narrow perspective of the COFHE institutions, however, the results should be reassuring if not encouraging. In general, students with the greatest academic ability are the most likely to apply to such colleges, and changes in students' family income level have a much smaller

1. It is important to remember that two students from different income groups may have to pay quite different amounts at the same college. Indeed, it is the express intent of financial aid practices at many institutions, and to a lesser extent of Federal and state aid programs as well, to reduce the net cost to students and their families to a point where they can afford to attend such institutions.

impact on their decisions to apply than comparable changes in ability. Despite their relatively high costs, these colleges continue to attract a disproportionate share of the very best students from a wide spectrum of socioeconomic backgrounds. The results reaffirm--and this may be the most encouraging finding of all from the perspective of the COFHE institutions--that this pattern has changed little since the earlier study was conducted in 1971, despite the significant increases in tuition and other student charges during this period.

Appendix A Regression Results

Definition of Variables

PCAPP: Percentage applying. Percentage of students in a given income/SAT category who applied to at least one institution in a given price/selectivity category.

NS: Number of schools. Number of United States colleges and universities that fall in a given price/selectivity category.

SAT: Student SAT score. The student's combined mathematics-verbal SAT score, in hundreds of points.

Y: Family income. Total income for the student's family in 1975, from all sources and before taxes, in thousands of dollars. (In the earlier study Y referred to family income in 1970.)

Select: Institutional selectivity. The median SAT score (combined mathematics and verbal) for all entering freshmen in the academic year 1970-71, in hundreds of points. (In the earlier study Select--then labeled Qual--referred to median SAT in 1967-68.)

Price: Institutional price. The total student budget (including tuition, room, board, and personal expenses) for 1976-77 as reported to the College Scholarship Service, in thousands of dollars. (In the earlier study this variable referred to the student budget in 1971-72.)

APP63: Application to a "63" institution. A dummy variable that takes the value 1 if the student applied to at least one institution that cost $6,000 a year or more and had a median combined SAT of 1300 or more, 0 otherwise.

APP43: Application to a "43" institution. A dummy variable that takes the value 1 if the student applied to at least one institution that cost $4,000 a year or more (in 1971-72) and had a median combined SAT score of 1300 or more, 0 otherwise. This variable was used as the primary dependent variable in the 1971 study and is approximately equivalent to the APP63 variable used in 1976.

Save: Savings. Total family savings (including investment assets but not the family home), in thousands of dollars.

Female: Student sex. A dummy variable that takes the value 1 if the student is female, 0 otherwise.

Race: Student race. A dummy variable that takes the value 1 if the student is nonwhite, 0 otherwise.

Jew: Student religion--Jewish. A dummy variable that takes the value 1 if the student is Jewish, 0 otherwise.

Cath: Student religion--Catholic. A dummy variable that takes the value 1 if the student is Roman Catholic, 0 otherwise.

Educ: Parental education. Number of years of schooling for the parent with the higher level of education.

PublicHS: Type of high school. A dummy variable that takes the value 1 if the student graduated from a public high school, 0 otherwise.

Rank: High school rank. The percentile in which the student finished in his or her graduating class; e.g., 0.95 for someone in the 95th percentile.

New England: Student home. A dummy variable that takes the value 1 if the student lives in New England, 0 otherwise.

Midwest: Student home. A dummy variable that takes the value 1 if the student lives in the Midwest, 0 otherwise.

South: Student home. A dummy variable that takes the value 1 if the student lives in the South or Southwest, 0 otherwise.

West: Student home. A dummy variable that takes the value 1 if the student lives in the Far West, 0 otherwise.

Dep: Number of dependent children. The total number of dependent children in the student's family, including the student.

NoAidApp: Aid application. A dummy variable that takes the value 1 if the student did not apply for financial aid at any of the colleges to which he or she applied, 0 otherwise.

APP62: Application to "62" institution. A dummy variable that takes the value 1 if the student applied to at least one institution that cost $6,000 a year or more and had a median combined SAT between 1200 and 1299, 0 otherwise.

APPCOFHE: Application to COFHE institution. A dummy variable that takes the value 1 if the student applied to at least one COFHE institution, 0 otherwise.

APPSTATE: Application to a selected state university. A dummy variable that takes the vaiue 1 if the student applied to at least one of a list of specific state universities, 0 otherwise.

Public Only: Applications. A dummy variable that takes the value 1 if the student applied only to public colleges and universities, 0 otherwise.

Independent Only: Applications. A dummy variable that takes the value 1 if the student applied only to independent colleges and universities, 0 otherwise.

Both: Applications. A dummy variable that takes the value 1 if the student applied to both public and independent institutions, 0 otherwise.

Table A.1 Regression Results for General Applications Model

Dependent Variable: PCAPP

Variable	1976 Survey Coefficient	t-Statistic	1971 Survey Coefficient	t-Statistic
Constant	4.889		-0.998	
NS	0.0002	3.06*	0.0018	13.89*
SAT	-0.3234	10.76*	0.0380	5.27*
SAT^2	0.0142	10.73*	----	
Y	----		0.0009	2.16*
Select	-0.5585	14.12*	0.0555	8.55*
$Select^2$	0.0267	15.36*	----	
Price	-0.0152	6.59*	----	
$(SAT-Select)^2$	-0.0091	10.84*	-0.0159	7.87*
Price/Y	-0.0204	2.06*	-0.0672	2.69*
R	.461		.337	
Number in sample	2,545		1,407	

*Significant at the 95 percent level.

Table A.2 Regression Results for Applications to Selective Colleges

Dependent Variable	APP63		APP43	
Variable	1976 Survey Coefficient	t-Statistic	1971 Survey Coefficient	t-Statistic
Constant	1.624		-1.522	
SAT	-0.3702	4.10*	0.1326	12.71*
SAT^2	0.0191	5.18*	----	
Y	0.0032	8.64*	0.0034	3.69*
Save	----		0.0014	1.29
Female	----		----	
Race	0.2014	9.15*	0.1401	2.13*
Jew	0.1363	4.47*	0.2589	7.19*
Cath	-0.0585	3.27*	----	
Educ	0.0073	2.22*	----	
PublicHS	-0.1225	6.33*	----	
Rank	0.2314	3.51*	----	
New England	0.2057	10.02*	----	
Midwest	-0.1153	5.92*	----	
South	-0.1046	5.17*	----	
Dep	-0.0130	2.28*	----	
NoAidApp	-0.0634	3.74*	----	
R^2	.262		.178	
Number in Sample	2,545		1,407	

*Significant at the 95 percent level.

Table A.3 Regression Results for Applications to Selective Colleges: By Subgroup

Dependent Variable: APP63

Variable	Men Coefficient	t-Statistic	Women Coefficient	t-Statistic	Whites Coefficient	t-Statistic	Nonwhites Coefficient	t-Statistic
Constant	1.595		1.619		1.512		1.683	
SAT	-0.3725	3.31*	-0.3507	2.29*	-0.3665	3.99*	-0.2891	0.87
SAT^2	0.0195	4.23*	0.0180	2.87*	0.0190	5.07*	0.0154	1.12
Y	0.0030	5.95*	0.0035	6.29*	0.0034	9.22*	0.0011	0.67
Race	0.2147	7.67*	0.1791	4.96*	----		----	
Jew	0.1150	2.83*	0.1594	3.42*	0.1351	4.52*	0.0351	0.20
Cath	-0.0576	2.51*	-0.0631	2.19*	-0.0525	2.83*	-0.0898	1.51
Educ	0.0063	1.47	0.0093	1.80	0.0087	2.53*	0.0078	0.77
PublicHS	-0.1059	4.38*	-0.1457	4.49*	-0.1196	5.96*	-0.1170	1.86
Rank	0.2655	3.38*	0.1180	0.89	0.2852	4.17*	-0.0212	0.10
New England	0.1829	6.78*	0.2374	7.44*	0.2073	10.17*	0.2130	2.09*
Midwest	-0.1496	5.96*	-0.0657	2.11*	-0.1078	5.41*	-0.1549	2.20*
South	-0.1203	4.54*	-0.0829	2.63*	-0.1101	5.32*	-0.0729	1.00
Dep	-0.0118	1.60	-0.0151	1.67	-0.0142	2.41*	-0.0046	0.24
NoAidApp	-0.0608	2.72*	-0.0664	2.55*	-0.0451	2.65*	-0.1997	2.88*
R^2	.269		.261		.286		.129	
Number in Sample	1,524		1,021		2,218		327	

*Significant at the 95 percent level.

Table A.3 continued

Variable	Protestant Coefficient	t-Statistic	Catholic Coefficient	t-Statistic	Jewish Coefficient	t-Statistic	NoAidApp Coefficient	t-Statistic	AidApp Coefficient	t-Statistic
Constant	1.078		1.135		-3.966		2.765		1.112	
SAT	-0.2813	2.47*	-0.2770	1.71	0.3394	0.69	-0.5687	3.63*	-0.2856	2.58*
SAT^2	0.0155	3.31*	0.0151	2.25*	-0.0070	0.36	0.0272	4.23*	0.0157	3.48*
Y	0.0035	7.25*	0.0034	4.53*	0.0033	2.86*	0.0039	9.28*	0.0009	1.10
Race	0.2353	7.81*	0.1765	4.59*	0.1050	0.66	0.0513	1.27	0.2513	9.49*
Jew	----		----		----		0.1362	3.55*	0.1113	2.31*
Cath	----		----		----		-0.1155	3.99*	-0.0258	1.13
Educ	0.0124	2.86*	0.0023	0.39	0.0269	1.59	0.0035	0.59	0.0135	3.31*
PublicHS	-0.1693	5.95*	-0.0606	2.16*	-0.1183	1.11	-0.1494	5.16*	-0.1020	3.96*
Rank	0.2095	2.57*	0.1625	1.27	0.8225	2.42*	0.3262	3.72*	0.1479	1.52
New England	0.1881	6.67*	0.1653	4.70*	0.3247	4.20*	0.2082	6.85*	0.1961	7.15*
Midwest	-0.1169	4.82*	-0.0992	2.68*	-0.2315	2.24*	-0.0967	3.09*	-0.1195	4.83*
South	-0.1242	5.19*	-0.0235	0.53	-0.0114	0.09	-0.1158	3.81*	-0.1040	3.88*
Dep	-0.0217	2.67*	-0.0095	1.07	0.0144	0.46	-0.0115	1.26	-0.0140	1.93
NoAidApp	-0.0521	2.49*	-0.1209	3.62*	0.0054	0.07	----		----	
R^2	.290		.195		.425		.354		.222	
Number in Sample	1,409		730		164		984		1,561	

*Significant at the 95 percent level.

Table A.3 continued

Variable	New England Coefficient	t-Statistic	Mid-Atlantic Coefficient	t-Statistic	Midwest Coefficient	t-Statistic	South Coefficient	t-Statistic	West Coefficient	t-Statistic
Constant	0.477		1.420		1.973		2.605		1.973	
SAT	-0.2341	1.12	-0.2899	1.21	-0.4262	2.63*	-0.5062	3.17*	-0.4660	1.95
SAT^2	0.0146	1.70	0.0156	1.61	0.0206	3.12*	0.0244	3.71*	0.0231	2.37*
Y	0.0036	3.34*	0.0058	6.60*	0.0021	3.22*	0.0010	1.71	0.0028	3.03*
Race	0.1851	2.02*	0.2713	5.47*	0.1570	4.15*	0.2117	4.65*	0.1251	2.89*
Jew	0.1972	2.58*	0.1358	2.42*	-0.0164	0.25	0.2297	2.42*	-0.0362	0.48
Cath	-0.0992	2.23*	-0.1035	2.39*	-0.0298	0.99	-0.0002	0.01	0.0134	0.30
Educ	0.0178	1.90	-0.0009	0.11	0.0120	2.30*	0.0005	0.08	0.0107	1.37
PublicHS	-0.2002	3.88*	-0.0548	1.05	-0.0731	2.42*	-0.1651	4.51*	-0.0912	1.86
Rank	0.5643	3.30*	0.0212	0.14	0.1214	1.18	0.0990	0.70	0.4267	2.55*
Dep	-0.0135	0.90	-0.0186	1.35	-0.0132	1.45	0.0145	1.28	-0.0270	1.98*
NoAidApp	-0.0891	1.87	-0.1169	2.66*	-0.0227	0.82	-0.0155	0.50	-0.0828	2.18*
R^2	.272		.251		.194		.237		.157	
Number in Sample	466		522		540		492		525	

*Significant at the 95 percent level.

Table A.4 Regression Results for Different Groups of Institutions

Dependent Variable	APP63		APP62		APPCOFHE		APPSTATE	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	1.624		-0.828		1.461		0.780	
SAT	-0.3702	4.10*	0.1125	1.20	-0.3575	3.62*	-0.1310	1.29
SAT^2	0.0191	5.18*	-0.0029	0.75	0.0194	4.79*	0.0055	1.32
Y	0.0032	8.64*	0.0017	4.49*	0.0035	8.62*	0.0010	2.31*
Race	0.2014	9.15*	0.0577	2.53*	0.2018	8.38*	0.0235	0.95
Jew	0.1363	4.47*	0.1467	4.63*	0.1016	3.04*	0.0383	1.11
Cath	-0.0585	3.27*	0.0373	2.01*	-0.0582	2.97*	0.0383	1.90
Educ	0.0073	2.22*	0.0069	2.02*	0.0088	2.45*	0.0067	1.80
PublicHS	-0.1225	6.33*	-0.0720	3.59*	-0.1381	6.52*	0.0653	2.99*
Rank	0.2314	3.51*	-0.0064	0.09	0.2581	3.58*	-0.0219	0.29
New England	0.2057	10.02*	0.2899	13.61*	0.2181	9.71*	0.2010	8.68*
Midwest	-0.1153	5.92*	-0.0207	1.03	-0.0824	3.87*	0.0318	1.45
South	-0.1046	5.17*	-0.0015	0.07	-0.0602	2.71*	-0.0064	0.28
Dep	-0.0130	2.28*	-0.0182	3.08*	-0.0148	2.37*	-0.0034	0.53
NoAidApp	-0.0634	3.74*	-0.0573	3.26*	-0.0889	4.79*	0.0012	0.06
R^2	.262		.136		.248		.046	
Number in Sample	2,545		2,545		2,545		2,545	

*Significant at the 95 percent level.

Table A.5 Regression Results: Public vs. Independent

Dependent Variable	Public Only		Independent Only		Both	
	Coefficient	t-Statistic	Coefficient	t-Statistic	Coefficient	t-Statistic
Constant	-0.996		0.145		1.497	
SAT	0.2555	2.40*	-0.0578	0.55	-0.1738	1.51
SAT^2	-0.0124	2.84*	0.0035	0.80	0.0082	1.73
Y	-0.0034	7.79*	0.0020	4.63*	0.0013	2.64*
Female	0.0057	0.33	0.0197	1.13	-0.0336	1.76
Race	-0.0851	3.26*	0.0794	3.09*	0.0153	0.54
Jew	0.0131	0.36	-0.0308	0.86	0.0285	0.73
Cath	0.0568	2.68*	-0.0821	3.93*	0.0320	1.39
Educ	-0.0080	2.05*	0.0134	3.50*	-0.0030	0.72
PublicHS	0.2021	8.84*	-0.1644	7.30*	-0.0375	1.51
Rank	-0.1336	1.69	0.3661	4.69*	-0.1204	1.41
New England	-0.0876	3.18*	0.0420	1.54	0.0603	2.02*
Midwest	0.2523	9.44*	-0.1046	3.97*	-0.1356	4.69*
South	0.2464	8.90*	-0.1619	5.93*	-0.0678	2.26*
West	0.2968	11.04*	-0.2409	9.09*	-0.0659	2.26*
Dep	0.0057	0.85	0.0009	0.14	-0.0082	1.13
NoAidApp	0.2499	12.49*	-0.0926	4.69*	-0.1207	5.57*
R^2	.215		.112		.046	
Number in Sample	2,545		2,545		2,545	

*Significant at the 95 percent level.

Appendix B A Description of the Analytical Techniques

A Simple Description of Regression Analysis

Regression analysis is but one of many techniques that can be used to measure the statistical relationship between two variables. Other techniques designed to do some of the same things include simple and multiple correlation, simple significance tests such as the t-test or the Chi-Square, analysis of variance, factor analysis, and so on. Each of these techniques has strengths and weaknesses, and it is normally a matter of judgment to determine which is most appropriate in any particular instance. This study has relied almost exclusively on the multiple regression as the method of analysis.

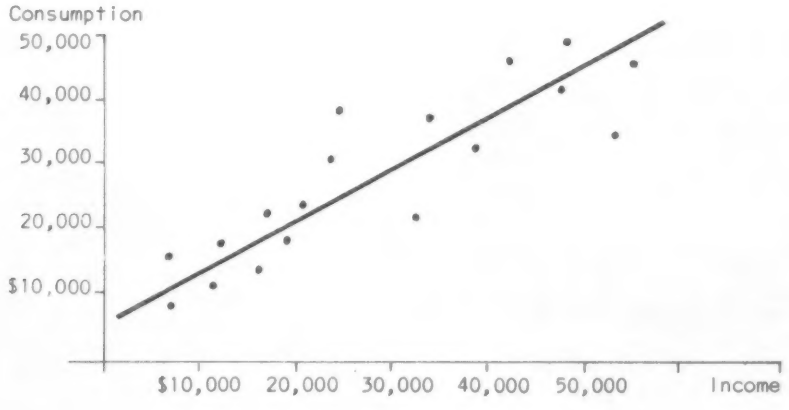
In its simplest form regression analysis is a technique for determining the degree to which two variables are related (i.e., their correlation) and also providing some estimate of the exact form of that relationship. Consider, for example, the relationship between consumption and income. The amount an individual will spend on consumer goods and services clearly depends at least in part on his or her income level. If it is known what different people spend and what their incomes are, regression analysis can be used to estimate the parameters of that relationship. If consumption is assumed to be a simple linear function of income ($C = a + bY$, where C is consumption and Y is income), then the data on actual consumption and income levels can be used to obtain estimates of a and b. In Figure B.1, a hypothetical consumption function is shown: the dots represent a scatterplot indicative of real consumption/income combinations; the straight line represents the regression results, the linear relationship that in some statistical sense "best fits" those data. In theory, these regression results should provide a reasonably good prediction of the amount an individual will spend on consumer goods, given his or her income level.

Regression analysis is also useful in considering the relationships among more than two variables. If, for example, consumption is believed to depend on an individual's accumulated assets or savings as well as his or her income, it is possible to estimate this relationship using

multiple regression techniques. These techniques can be used to estimate the parameters a, b, and c in the assumed relationship C = a + bY + cA (where A is assets) in much the same way that a and b were estimated earlier. In theory, then, the effects of income and assets on consumption can be measured separately to predict what will happen to consumption for a given change in income assuming that assets do not change. When it is used correctly the multiple regression technique has this advantage: although consumption depends on both income and assets and although it will probably not be possible to obtain data for many individuals with identical assets but different income and consumption levels, it is still possible to measure the effect of changes in income on consumption while separating out any effect of changes in assets.

In addition to the estimated coefficients (e.g., a, b, and c of the consumption function), the multiple regression provides a number of other useful statistics. One such statistic is the coefficient of multiple determination or, as it is commonly referred to, the R^2. The R^2 is the square of the multiple correlation between the dependent variable (e.g., consumption) and the set of independent variables being used to predict the dependent variable (e.g., income and assets). In particular, the value of the R^2 indicates the percentage of the variation in the dependent variable that can be "explained" simply by the changes in the independent variables. Intuitively, then, the R^2 measures the degree to which the regression model fits the data: a scatterplot in which all

Figure B.1 Regression Example



of the individual observations fell neatly along a straight line would be an example of a "perfect fit" and the regression analysis would produce an R^2 of 1.00, meaning that 100 percent of the variation could be "explained."

Another useful statistic is the t-statistic. Regression analysis produces a t-statistic for each estimated coefficient and, in the normal regression models, these t-statistics give an indication of whether or not a particular independent variable really does have an effect on the dependent variable. In particular, the t-statistic measures the degree of confidence one can have from the available data that the true coefficient is different from zero (which would imply that no relationship exists between the dependent and the independent variable). If, for example, a coefficient is described as being "statistically significant at the 95 percent level," one can be 95 percent certain that there is a relationship between the two variables and that the true coefficient is something other than zero.

Some Special Problems Faced in This Study: A Technical Note

At several points in the main body of this report, mention is made of special statistical problems faced in the particular analyses used in this study. The purpose of this section of the report is to describe in some detail an additional statistical problem that was faced in the study and to review some of the consequences of proceeding along the lines described in the main part of the report. The discussion here is couched in more technical terms than the rest of the report, but readers who are not statistically inclined should not be concerned. The purpose of this discussion is not to present new or different results but to convince those who are familiar with the statistical problems involved in analyses of this kind that those problems do not materially affect the results reported in this study.

The particular problem being referred to is the use of ordinary least squares estimators in a regression model with a dichotomous dependent variable. In all of the regressions reported in Chapters 3-6, the dependent variable (APP--) was a dummy variable that took the value

one if the student applied to a certain group of institutions and zero if he or she did not. In such cases there are several problems associated with the ordinary least squares estimators used.

First, the error terms are heteroscedastic. Under this condition the estimates of the coefficients are inefficient, even though they are unbiased, and the estimates for the variances of the estimated coefficients are biased and inconsistent. This also means that the standard test of significance using these variances (i.e., the use of the t-statistic) is inappropriate. A generalized or weighted least squares procedure would have incorporated this information about the error terms and provided more efficient estimates of these coefficients and unbiased estimates of these variances. This procedure was not used because preliminary investigations indicated the results would not be sufficiently different to justify the added cost of the analysis.

Second, using ordinary least squares estimates and the kind of unbounded functional forms presented in Chapters 3-6 can result in predicted probabilities less than zero or greater than one. This is especially likely when the results of such a regression are used to try to predict what would happen if the independent variables took values well outside the ranges observed in the regression sample. For example, extrapolating the results of Figure 3.1 to SAT levels below those observed in the study group (e.g., SAT = 800) would imply that the probability of such students applying to a "63" college is less than zero. Obviously, no real probability can ever be less than zero.

Third, the use of a dichotomous dependent variable results in an abnormally low value for R^2. The predicted values of the dependent variable are continuous (normally between zero and one), but the actual observed values are all either zero or one; the student either applied or he did not. Therefore, the observed value is almost never predicted exactly, even if the regression provides a perfect estimate of the probability of applying. This means that the sum of the squared residuals is always high. Thus, a low R^2 is not always an indication that the regression lacks explanatory power.

One way of avoiding these problems is to use what is known as a

"logit" estimator. (Figure B.2 shows graphically what the logit function looks like, compared to the simple linear function used in most of the earlier models.) Logit analysis is a somewhat more difficult--and expensive--technique to use when there are as many variables and as many observations as existed in most of the regressions in this study. It was not practical, therefore, to use logit analysis throughout the study. In order to see if the results were affected by the use of ordinary least squares, however, one logit regression was run using a maximum likelihood estimator. In this regression the same variables were used as had been used in Chapter 3: the probability of applying to at least one college in the "63" category as a function of SAT scores, family income, race, sex, etc. The results of that logit regression are reported in Table B.1.

Because the functional forms are so different, it is not possible simply to compare the coefficients in Table B.1 with the ordinary least squares estimates (Table A.2). Figures B.3 and B.4, however, show the predicted levels of APP63 for different levels of SAT score and family income respectively, using both the logit and the ordinary least squares estimators. Although the functional forms are, by definition, different for the two estimators, they give almost identical results over the ranges shown in those figures. It appears, then, that nothing has been lost in terms of statistical accuracy by using ordinary least squares. For the range of values that are of interest in this study, the ordinary least squares regressions provide essentially the same estimates as the more sophisticated logit technique. Despite the apparent statistical problems associated with using ordinary least squares in these models, it appears that the results are largely unaffected by the choice of analytical technique.

Figure B.2 Logit Example

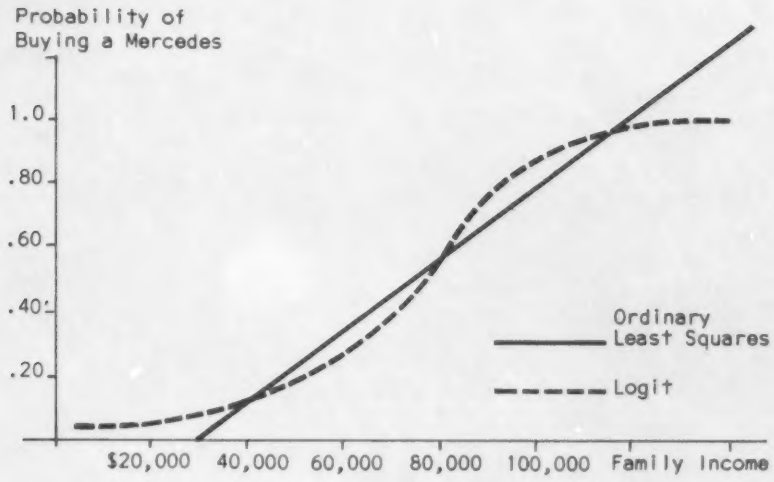


Table B.1 Logit Analysis of APP63*

Variable	Coefficient	Significance Test
Constant	-2.0656	0.41
SAT	-0.9647	1.20
SAT^2	0.0667	2.07
Y	0.0199	7.40
Female	-0.0614	0.53
Race	1.4575	9.38
Jew	0.9198	4.61
Cath	-0.3572	2.55
Educ	0.0723	2.74
PublicHS	-0.8568	5.89
Rank	1.7665	3.13
New England	1.5025	11.00
Midwest	-0.8650	4.94
South	---	---
Dep	-0.1062	2.35
NoAidApp	-0.4994	3.70

*The equation estimated in the logit analysis takes the form $P = \left(1 + e^{-(a + bX)}\right)^{-1}$ where $\underline{P}$ is the dummy dependent variable and $\underline{X}$ is the vector of independent variables.

Figure B.3

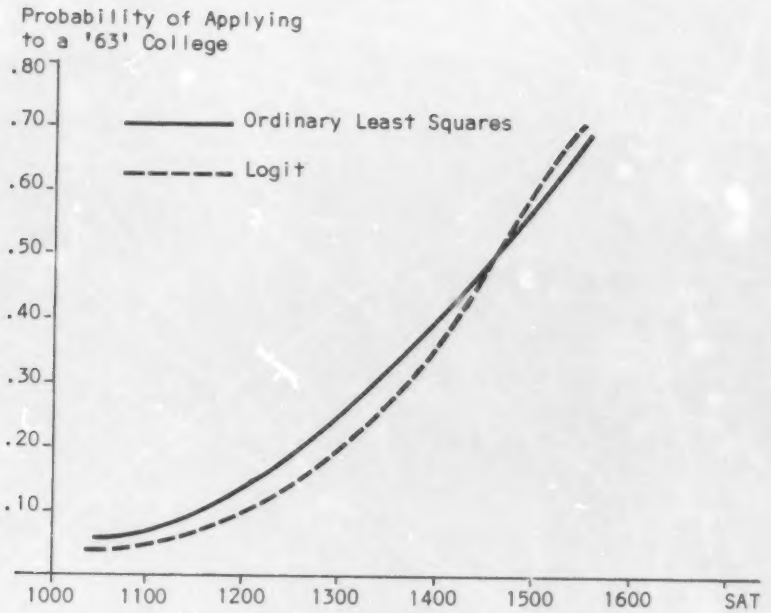
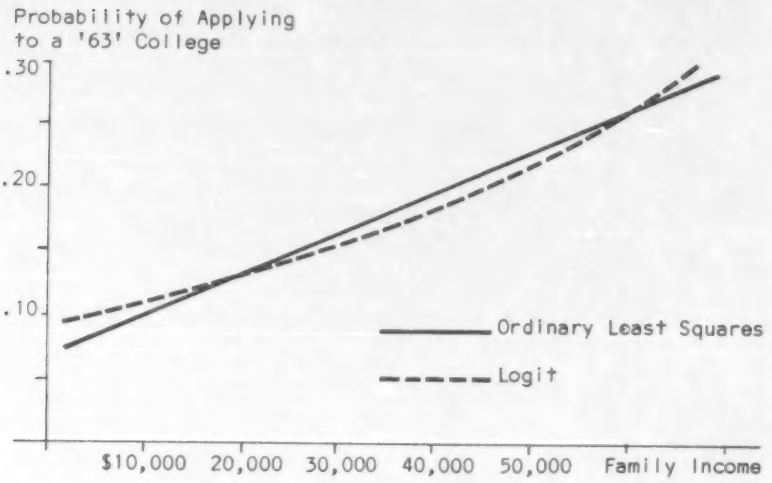


Figure B.4



Appendix C Survey Questionnaire

COLLEGE SELECTION STUDY

Please read the questions carefully. Please answer the questions by circling the number in front of the appropriate answer or, where the question calls for a written answer, by writing your answer in the space provided. We urge you to consult with your son or daughter when filling out the questionnaire. Thank you in advance for your cooperation.

Your answers to this questionnaire will be kept completely confidential. Your answers will be used for statistical purposes only and your name will never be used in the reporting of the results.

1. Primary person responding to this questionnaire 1 Male parent or guardian
   2 Female parent or guardian

2. Did your son or daughter apply to college? 1 Yes 2 No - Skip to question 13

3. Please list all the colleges to which your child applied.

	NAME	LOCATION (City and State)
1		
2		
3		
4		
5		
6		

For question #4-5, please refer to the list of schools you gave in Question 3 by using the number provided in the left hand column.

4. Please indicate at which of the colleges listed your son or daughter was accepted for admission. (Circle as many numbers as appropriate.)

   1 2 3 4 5 6 None (7)

5. Please indicate which college your child plans to attend.

   1 2 3 4 5 6 None (7)

   (If your answer to this question is "None," please skip to Question 13.)

6. Will your child be living at home while attending this college? 1 Yes 2 No

7. How far is this college from your home? 1 Less than 100 miles

   2 100-300 miles 3 More than 300 miles

Again, using the list of schools provided in Question 3, we would like to ask you some questions regarding college financing.

8. Please indicate the colleges to which your child applied for financial aid. (Circle as many numbers as appropriate.)

   1 2 3 4 5 6 None (7)

9. Please indicate the colleges which offered your son or daughter financial aid. (Circle as many numbers as appropriate.)

   1 2 3 4 5 6 None (7)

10. Approximately what do you estimate will be the total costs for the freshman year of the college your son or daughter will be attending?

    (estimate to nearest $100)

    1. tuition and fees _____
    2. room and board _____
    3. transportation and personal expenses _____
    4. TOTAL _____

11. From what sources do you expect your son or daughter to finance the costs of his or her freshman year in college? (The total amount should correspond to the total shown above in line 4 of question 10.)

    FROM (estimate to nearest $100)

    1. parental or family resources _____
    2. scholarships or grants from any source _____

3. your son or daughter's own earnings or savings _____

4. student loans _____

5. TOTAL _____*

*This total should equal the total shown under line 4 of question 10.

If the total estimated cost of your son or daughter's freshman year in college shown above in questions 10 and 11 is $4,500 or less, we would like to ask you a further question. The question concerns the general awareness of families about the availability of financial aid at higher priced institutions. If the total estimated cost is $4,500 or more, skip to question 13.

12. Suppose your son or daughter were planning to attend a higher priced institution. Based on your income and assets, what sources of financial aid do you believe would be available to your child and how much of the cost of attendance (say, for example, $6,000) would you, the parents, be expected to pay? Please use the table below. (Obviously you do not know the true answer to this question since your child is not attending a high cost college, but please indicate what you think would happen.)

(estimate to nearest $100)

1. Estimated amount which would be available from grants, scholarships _____

2. Estimated amount which would be available from student loans _____

3. Estimated amount to be earned by your son or daughter _____

4. Estimated amount which would be expected of you, the parents _____

5. TOTAL $6,000*

*The amounts in lines 1 through 4 should equal $6,000.

13. Did your child graduate from a public or private high school? (Circle one.)

1 Public
2 Private

14. What was your son or daughter's approximate rank in his or her high school class? (Circle one.)

1 Highest tenth
2 Second tenth
} top fifth

3 Second fifth
4 Middle fifth
5 Fourth fifth
6 Lowest fifth

15. Please indicate the highest level of education which you completed.

1 Grade school
2 Some high school
3 High school diploma
4 Business or trade school
5 Some college
6 College graduate
7 Some graduate or professional school
8 Graduate or professional degree

16. Please indicate the highest level of education which your spouse completed.

1 Grade school
2 Some high school
3 High school diploma
4 Business or trade school
5 Some college
6 College graduate
7 Some graduate or professional school
8 Graduate or professional degree

17. Using the table below, please indicate the total number of dependent children you have and the number of such children who will be attending college this fall, including the child who is the subject of this questionnaire. (Please circle the appropriate numbers.)

# dependent children	1	2	3	4	5	6 or more
# dependent children in college in fall, 1976	1	2	3	4	5	6 or more

18. What is your religious preference?

1 Protestant 2 Catholic 3 Jewish 4 Other (please specify)_____

19. How does the student who is the subject of this questionnaire describe himself or herself?

1 American Indian
2 Black or Afro-American or Negro
3 Mexican-American or Chicano
4 Oriental or Asian-American
5 Puerto Rican or Spanish-speaking American
6 White or Caucasian
7 Other (please specify)_____

20. Using the table below, what was your approximate total family income from all sources in 1975 before taxes?

1 Under $5,000
2 $5,000-$9,999
3 $10,000-$14,999
4 $15,000-$19,999
5 $20,000-$24,999
6 $25,000-$29,999
7 $30,000-$34,999
8 $35,000-$39,999
9 $40,000-$44,999
10 $45,000-$49,999
11 $50,000-$99,999
12 $100,000 or more

21. Does the amount circled include earnings of 1 One parent 2 Both parents (Circle one)

22. What is the approximate total amount of your savings, including all stocks, bonds, and other investments? (Do not include the value of your home.)

Specify dollar amount _____

Please return this questionnaire in the enclosed envelope. Thank you very much for your cooperation!

Appendix D Geographic Regions

Middle Atlantic: Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania

Midwest: Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, West Virginia, Wisconsin

New England: Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont

South: Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, New Mexico, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia

West: Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, Oregon, Utah, Washington, Wyoming